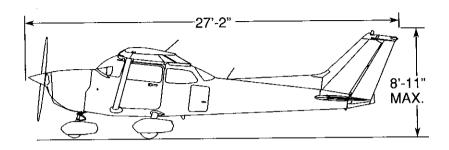
SECTION 1 GENERAL

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NOTE 1: WING SPAN SHOWN WITH STROBE LIGHTS

INSTALLED.

NOTE 2: WHEEL BASE LENGTH IS 65".

NOTE 3: PROPELLER GROUND CLEARANCE IS 11 1/4".

NOTE 4: WING AREA IS 174 SQUARE FEET.

NOTE 5: MINIMUM TURNING RADIUS (* PIVOT POINT TO

OUTBOARD WING TIP) IS 27'-5 1/2".

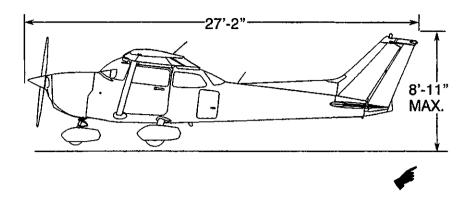
NOTE 6: NORMAL GROUND ATTITUDE IS SHOWN WITH

NOSE STRUT SHOWING APPROXIMATELY 2" OF

STRUT, AND WINGS LEVEL.

0510T1005

Figure 1-1. Three View - Normal Ground Attitude (Sheet 2)



NOTE 1: WING SPAN SHOWN WITH STROBE LIGHTS

INSTALLED.

NOTE 2: WHEEL BASE LENGTH IS 65".

NOTE 3: PROPELLER GROUND CLEARANCE IS 11 1/4".

NOTE 4: WING AREA IS 174 SQUARE FEET.

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NOSE STRUT SHOWING APPROXIMATELY 2" OF

STRUT, AND WINGS LEVEL.

0510T1005

Figure 1-1. Three View - Normal Ground Attitude (Sheet 2 of 2)

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NOTE

Isopropyl alcohol or diethylene glycol monomethyl ether (DiEGME) may be added to the fuel supply. Additive concentrations shall not exceed 1% for isopropyl alcohol or 0.10% to 0.15% for DIEGME. Refer to Section 8 for additional information.

Fuel Capacity:

Total Capacity:

56.0 U.S. gallons.

Total Usable:

53.0 U.S. gallons.

Total Capacity Each Tank: 28.0 U.S. gallons.

Total Usable Each Tank:

26.5 U.S. gallons.

NOTE

To ensure maximum fuel capacity and minimize crossfeeding when refueling, always park the airplane in a wingslevel, normal ground attitude and place the fuel selector in the Left or Right position. Refer to Figure 1-1 for normal ground attitude dimensions.

OIL

Oil Specification:

MIL-L-6082 or SAE J1966 Aviation Grade Straight Mineral Oil: Used when the airplane was delivered from the factory and should be used to replenish the supply during the first 25 hours. This oil should be drained and the filter changed after the first 25 hours of operation. Refill the engine with MIL-L-6082 or SAE J1966 Aviation Grade Straight Mineral Oil and continue to use until a total of 50 hours has accumulated or oil consumption has stabilized.

MIL-L-22851 or SAE J1899 Aviation Grade Ashless Dispersant Oil: Oil conforming to the latest revision and/or supplements to Textron Lycoming Service Instruction No. 1014, must be used after first 50 hours or once oil consumption has stabilized.

Weight in Baggage Compartment, Normal Category:

Baggage Area 1 (Station 82 to 108): 120 lbs. See note below. Baggage Area 2 (Station 108 to 142): 50 lbs. See note below.

NOTE

The maximum combined weight capacity for Baggage Area 1 and Baggage Area 2 is 120 lbs.

Weight in Baggage Compartment, Utility Category:

In this category, the rear seat must not be occupied and the baggage compartment must be empty.

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight: 1639 lbs.

Maximum Useful Load, Normal Category: 818 lbs.

Maximum Useful Load, Utility Category: 468 lbs.

CABIN AND ENTRY DIMENSIONS

Detailed dimensions of the cabin interior and entry door openings are illustrated in Section 6.

BAGGAGE SPACE AND ENTRY DIMENSIONS

Dimensions of the baggage area and baggage door opening are illustrated in detail in Section 6.

SPECIFIC LOADINGS

Wing Loading: 14.1 lbs./sq. ft. Power Loading: 15.3 lbs./hp.

METEOROLOGICAL TERMINOLOGY

OAT Outside Air Temperature is the free air static

temperature. It may be expressed in either degrees

Celsius or degrees Fahrenheit.

Standard **Standard Temperature** is 15°C at sea level

Temperature pressure altitude and decreases by 2°C for each

1000 feet of altitude.

Pressure **Pressure Altitude** is the altitude read from an

Altitude altimeter when the altimeter's barometric scale has

been set to 29.92 inches of mercury (1013 mb).

ENGINE POWER TERMINOLOGY

BHP Brake Horsepower is the power developed by the

engine.

RPM Revolutions Per Minute is engine speed.

Static **Static RPM** is engine speed attained during a full

RPM throttle engine runup when the airplane is on the

ground and stationary.

MAP Manifold Absolute Pressure is the absolute

pressure measured in the engine induction system. MAP is measured in units of inches of mercury

(inHG).

Lean Decreased proportion of fuel in the fuel-air mixture

supplied to the engine. As air density decreases, the amount of fuel required by the engine decreases for a given throttle setting. Adjusting the fuel-air mixture to provide a smaller portion of fuel is known

as "leaning" the mixture.

Rich Increased proportion of fuel in the fuel-air mixture

supplied to the engine. As air density increases, the

amount of fuel required by the engine increases for a given throttle setting. Adjusting the fuel-air mixture to provide a greater portion of fuel is known as

"richening" the mixture.

Full Rich Mixture control full forward (pushed in, full control

travel, toward the panel).

Idle Cutoff Mixture control full aft (pulled out, full control travel,

away from the panel).

Mixture

Mixture

METEOROLOGICAL TERMINOLOGY

OAT Outside Air Temperature is the free air static

temperature. It may be expressed in either degrees

Celsius or degrees Fahrenheit.

Standard **Standard Temperature** is 15°C at sea level

Temperature pressure altitude and decreases by 2°C for each

1000 feet of altitude.

Pressure **Pressure Altitude** is the altitude read from an

Altitude altimeter when the altimeter's barometric scale has

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Mixture supplied to the engine. As air density increases, the

amount of fuel required by the engine increases for a given throttle setting. Adjusting the fuel-air mixture to provide a greater portion of fuel is known as

"richening" the mixture.

Full Rich Mixture control full forward (pushed in, full control

travel, toward the panel).

Idle Cutoff Mixture control full aft (pulled out, full control travel,

toward the panel).

Moment

WEIGHT AND BALANCE TERMINOLOGY

Reference Datum is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.

Station Station is a location along the airplane fuselage given in terms of the distance from the reference datum.

Arm is the horizontal distance from the reference datum to the center of gravity (C.G.) of an item.

Moment is the product of the weight of an item multiplied by its arm. (Moment divided by the constant 1000 is used in this handbook to simplify balance calculations by reducing the number of digits.)

Center of Gravity is the point at which an airplane, or equipment, would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

METRIC / IMPERIAL / U.S. CONVERSION CHARTS

The following charts have been provided to help international operators convert U.S. measurement supplied with the Pilot's Operating Handbook into metric and imperial measurements.

The standard followed for measurement units shown, is the National Institute of Standards Technology (NIST), Publication 811, "Guide for the Use of the International System of Units (SI)."

Please refer to the following pages for these charts.

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(Kilograms \times 2.205 = Pounds) - (Pounds \times .454 = Kilograms)

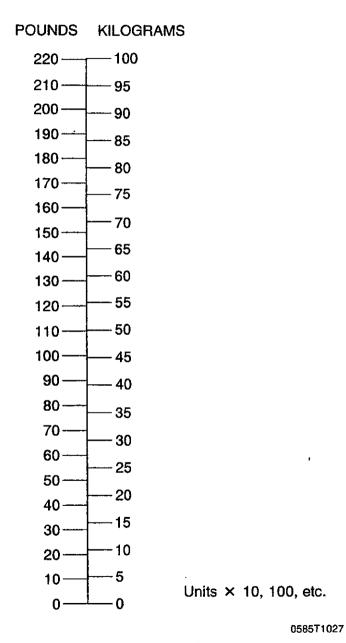


Figure 1-2. Weight Conversions (Sheet 2 of 2)

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(Meters \times 3.281 = Feet) (Feet \times .305 = Meters)

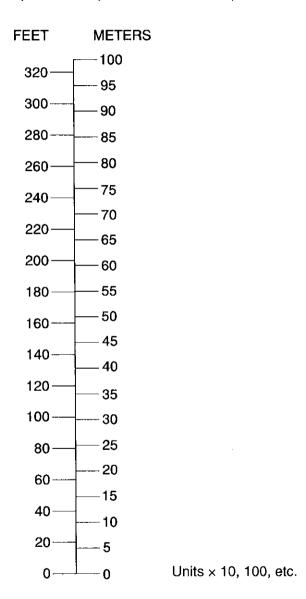


Figure 1-3. Length Conversions (Sheet 2)

 $(Inches \times 2.54 = Centimeters)$ (Centimeters \times .394 = Inches) INCHES CENTIMETERS 10-- 25 -24 - 23 - 22 - 21 20 - 19 - 17 - 16 - 15 **- 14** - 13 - 12[.] - 11 Units × 10, 100, etc. 0585T1028

Figure 1-4. Length Conversions (Sheet 2)

(Imperial Gallons × 4.546 = Liters) (Liters × .22 = Imperial Gallons)

	4
1	

LITERS INTO IMPERIAL GALLONS LITRES EN GALLONS IMPERIAL

Lt	0	1	2	3	4	5	6	7	8	9
	IG									
0		0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.960	4.180
20	4.400	4.620	4.840	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.699	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.779
50	10.999	11.219	11.439	11.659	11.879	12.099	12.319	12.539	12.759	12.979
60	13.199	13.419	13.639	13.859	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.038	18.258	18.478	18.698	18.918	19.138	19.358	19.578
90	19.798	20.018	20.238	20.458	20.678	20.898	21.118	21.338	21.558	21.778
100	21.998	22.218	22.438	22.658	22.878	23.098	23.318	23.537	23.757	23.977

IMPERIAL GALLONS INTO LITERS GALLONS IMPERIAL EN LITRES

IG	0.	1	2	3	4	5	6	7	8	9
	Lt									
0		4.546	9.092	13.638	18.184	22.730	27.276	31.822	36.368	40.914
10	45.460	50.006	54.552	59.097	63.643	68.189	72.735	77.281	81.827	86.373
20	90.919	95.465	100.01	104.56	109.10	113.65	118.20	122.74	127.29	131.83
30	136.38	140.93	145.47	150.02	154.56	159.11	163.66	168.20	172.75	177.29
40	181.84	186.38	190.93	195.48	200.02	204.57	209.11	213.66	218.21	222.75
50	227.30	231.84	236.39	240.94	245.48	250.03	254.57	259.12	263.67	268.21
60	272.76	277.30	281.85	286.40	290.94	295.49	300.03	304.58	309.13	313.67
70	318.22	322.76	327.31	331.86	336.40	340.95	345.49	350.04	354.59	359.13
80	363.68	368.22	372.77	377.32	381.86	386.41	390.95	395.50	400.04	404.59
90	409.14	413.68	418.23	422.77	427.32	431.87	436.41	440.96	445.50	450.05
100	454.60	459.14	463.69	468.23	472.78	477.33	481.87	486.42	490.96	495.51

Figure 1-6. Volume Conversions (Sheet 1 of 3)

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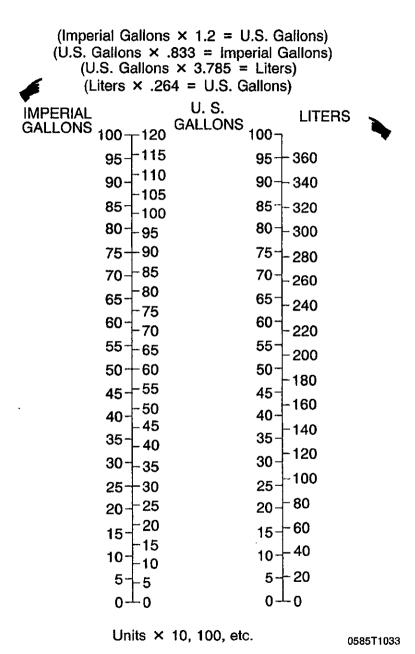


Figure 1-6. Volume Conversions (Sheet 3 of 3)

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PRESSURE CONVERSION HECTOPASCALS (MILLIBARS) TO INCHES MERCURY (inHG)



Figure 1-8. Hectopascals to Inches Mercury

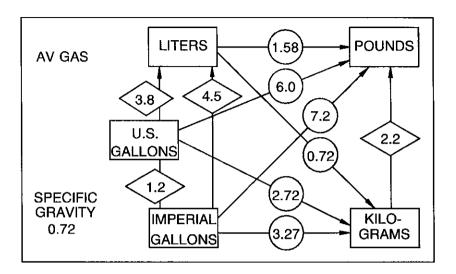


Figure 1-10. Quick Conversions

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INTRODUCTION

Section 2 includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section and in Section 9 have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by Federal Aviation Regulations.

NOTE

Refer to the Supplements, Section 9, of this Pilot's Operating Handbook for amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options.

NOTE

The airspeeds listed in the Airspeed Limitations chart (Figure 2-1) and the Airspeed Indicator Markings chart (Figure 2-2) are based on Airspeed Calibration data shown in Section 5 with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section 5.

The Cessna Model No. 172R is certificated under FAA Type Certificate No. 3A12.

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AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their color code significance are shown in Figure 2-2.

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	33 - 85	Full Flap Operating Range. Lower limit is maximum weight V _{S0} in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	44 -129	Normal Operating Range. Lower limit is maximum weight V _{S1} at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	129-163	Operations must be conducted with caution and only in smooth air.
Red Line	163	Maximum speed for all operations.

Figure 2-2. Airspeed Indicator Markings

POWERPLANT LIMITATIONS

Engine Manufacturer: Textron Lycoming. Engine Model Number: 10-360-L2A. Maximum Power: 160 BHP rating.

Engine Operating Limits for Takeoff and Continuous Operations:

Maximum Engine Speed: 2400 RPM.

NOTE

The static RPM range at full throttle is 2065 - 2165 RPM.

Maximum Oil Temperature: 245°F (118°C). Oil Pressure, Minimum: 20 PSI.

Maximum: 115 PSI.

WEIGHT LIMITS

NORMAL CATEGORY

Maximum Ramp Weight: 2457 lbs. Maximum Takeoff Weight: 2450 lbs. Maximum Landing Weight: 2450 lbs.

Maximum Weight in Baggage Compartment: Baggage Area 1 - Station 82 to 108:120 lbs. Baggage Area 2 - Station 108 to 142: 50 lbs.

NOTE

The maximum combined weight capacity for baggage areas 1 and 2 is 120 lbs.

UTILITY CATEGORY

Maximum Ramp Weight: 2107 lbs. Maximum Takeoff Weight: 2100 lbs. Maximum Landing Weight: 2100 lbs.

Maximum Weight in Baggage Compartment: In the utility category, the baggage compartment and rear seat must not be occupied.

CENTER OF GRAVITY LIMITS

NORMAL CATEGORY

Center of Gravity Range:

Forward: 35.0 inches aft of datum at 1950 lbs. or less, with

straight line variation to 40.0 inches aft of datum at

2450 lbs.

Aft: 47.3 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

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UTILITY CATEGORY

This airplane is not designed for purely aerobatic flight. However, in the acquisition of various certificates such as commercial pilot and flight instructor, certain maneuvers are required by the FAA. All of these maneuvers are permitted in this airplane when operated in the utility category.

In the utility category, the rear seat must not be occupied and the baggage compartment must be empty.

UTILITY CATEGORY MANEUVERS AND RECOMMENDED ENTRY SPEED*

Chandelles	105 Knots
Lazy Eights	105 Knots
Steep Turns	95 Knots
Spins Slow	Deceleration
Stalls (Except Whip Stalls) Slow	Deceleration

^{*} Abrupt use of the controls is prohibited above 92 knots.

Aerobatics that may impose high loads should not be attempted. The important thing to bear in mind in flight maneuvers is that the airplane is clean in aerodynamic design and will build up speed quickly with the nose down. Proper speed control is an essential requirement for execution of any maneuver, and care should always be exercised to avoid excessive speed which in turn can impose excessive loads. In the execution of all maneuvers, avoid abrupt use of controls.

FUEL LIMITATIONS

Total Fuel: 56 U.S. gallons (2 tanks at 28.0 gallons each).

Usable Fuel (all flight conditions): 53.0 U.S. gallons.

Unusable Fuel: 3.0 U.S. gallons (1.5 gallons each tank).

NOTE

To ensure maximum fuel capacity and minimize cross-feeding when refueling, always park the airplane in a wings-level, normal ground attitude and place the fuel selector in the Left or Right position. Refer to Figure 1-1 for normal ground attitude definition.

ADDITIONAL FUEL LIMITATIONS

Takeoff and land with the fuel selector valve handle in the BOTH position.

Maximum slip or skid duration with one tank dry: 30 seconds.

Operation on either LEFT or RIGHT tank limited to level flight only.

With 1/4 tank or less, prolonged uncoordinated flight is prohibited when operating on either left or right tank.

Fuel remaining in the tank after the fuel quantity indicator reads 0 (red line) cannot be safely used in flight.

Approved Fuel Grades (and Colors):

100LL Grade Aviation Fuel (Blue). 100 Grade Aviation Fuel (Green).

OTHER LIMITATIONS

FLAP LIMITATIONS

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2. On the fuel selector valve:

	TAKEOFF LANDING	BOTH 53.0 GAL.	ALL FLIGHT ATTITUDES
		FUEL SELECT	
LEF 26.5 GA LEVEL FLIGH ONLY	ÀL. - IT		RIGHT 26.5 GAL. LEVEL FLIGHT ONLY

3. Near fuel tank filler cap:

FUEL 100LL/ 100 MIN. GRADE AVIATION GASOLINE CAP. 26.5 U.S. GAL. USABLE CAP 17.5 U.S. GAL USABLE TO BOTTOM OF FILLER INDICATOR TAB

4. On flap control indicator:

0° to 10°	110 KIAS	(Partial flap range with blue color code; also, mechanical detent at 10°.)
10° to 30°	85 KIAS	(White color code; also, mechanical detent at 20°.)

10. On the Upper Right Side of the Aft Cabin Partition:

EMERGENCY LOCATOR TRANSMITTER INSTALLED AFT OF THIS PARTITION MUST BE SERVICED IN ACCORDANCE WITH FAR PART 91.207

11. On forward face of firewall adjacent to the battery:

CAUTION 24 VOLTS D.C.
THIS AIRCRAFT IS EQUIPPED WITH ALTERNATOR
AND A NEGATIVE GROUND SYSTEM.
OBSERVE PROPER POLARITY
REVERSE POLARITY WILL DAMAGE ELECTRICAL
COMPONENTS.

12. On the upper right instrument panel:

SMOKING PROHIBITED

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3-1

INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunctions are extremely rare if proper preflight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem. Emergency procedures associated with standard avionics, the ELT, or any optional systems can be found in the Supplements, Section 9.

AIRSPEEDS

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:	
Wing Flaps Up	65 KIAS
Wing Flaps Down	60 KIAS
Maneuvering Speed:	
2450 Lbs	99 KIAS
2100 Lbs	92 KIAS
1600 Lbs	82 KIAS
Maximum Glide	65 KIAS
Precautionary Landing With Engine Power	60 KIAS
Landing Without Engine Power:	
Wing Flaps Up	65 KIAS
Wing Flaps Down	60 KIAS

ENGINE FAILURE DURING FLIGHT (Restart Procedures)

- 1. Airspeed -- 65 KIAS.
- 2. Fuel Shutoff Valve -- ON (push full in).
- 3. Fuel Selector Valve -- BOTH.
- 4. Auxiliary Fuel Pump Switch -- ON.
- 5. Mixture -- RICH (if restart has not occurred).
- 6. Ignition Switch -- BOTH (or START if propeller is stopped).

NOTE

If the propeller is windmilling, the engine will restart automatically within a few seconds. If the propeller has stopped (possible at low speeds), turn the ignition switch to START, advance the throttle slowly from idle and lean the mixture from full rich as required for smooth operation.

7. Auxiliary Fuel Pump Switch -- OFF.

NOTE

If the fuel flow indicator immediately drops to zero (indicating an engine-driven fuel pump failure), return the Auxiliary Fuel Pump Switch to the ON position.

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

- 1. Passenger Seat Backs -- MOST UPRIGHT POSITION.
- 2. Seats and Seat Belts -- SECURE.
- Airspeed -- 65 KIAS (flaps UP).
 60 KIAS (flaps DOWN).
- 4. Mixture -- IDLE CUT OFF.
- 5. Fuel Shutoff Valve -- OFF (Pull Full Out).
- 6. Ignition Switch -- OFF.
- 7. Wing Flaps -- AS REQUIRED (30° recommended).
- 8. Master Switch -- OFF (when landing is assured).
- 9. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
- 10. Touchdown -- SLIGHTLY TAIL LOW.
- 11. Brakes -- APPLY HEAVILY.

FIRES

DURING START ON GROUND

1. Ignition Switch -- START, Continue Cranking to get a start which would suck the flames and accumulated fuel into the engine.

If engine starts:

- 2. Power -- 1700 RPM for a few minutes.
- 3. Engine -- SHUTDOWN and inspect for damage.

If engine fails to start:

- 4. Throttle -- FULL OPEN.
- 5. Mixture -- IDLE CUT OFF.
- 6. Cranking -- CONTINUE.
- 7. Fuel Shutoff Valve -- OFF (Pull Full Out).
- 8. Auxiliary Fuel Pump Switch -- OFF.
- 9. Fire Extinguisher -- OBTAIN (have ground attendants obtain if not installed).
- 10. Engine -- SÉCURE.
 - a. Master Switch -- OFF.
 - b. Ignition Switch -- OFF
- 11. Parking Brake -- RELEASE.
- 12. Airplane -- EVACUATE.
- 13. Fire -- EXTINGUISH using fire extinguisher, wool blanket, or dirt
- 14. Fire Damage -- INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

ENGINE FIRE IN FLIGHT

- 1. Mixture -- IDLE CUT OFF.
- 2. Fuel Shutoff Valve -- OFF (Pull Full Out).
- 3. Auxiliary Fuel Pump Switch -- OFF.
- 4. Master Switch -- OFF.
- 5. Cabin Heat and Air -- OFF (except overhead vents).
- 6. Airspeed -- 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed within airspeed limitations which will provide an incombustible mixture).
- 7. Forced Landing -- EXECUTE (as described in Emergency Landing Without Engine Power).

WING FIRE

- 1. Landing/Taxi Light Switches -- OFF.
- 2. Navigation Light Switch -- OFF.
- 3. Strobe Light Switch -- OFF.
- 4. Pitot Heat Switch -- OFF.

NOTE

Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

ICING

INADVERTENT ICING ENCOUNTER

- 1. Turn pitot heat switch ON.
- 2. **Turn back or change altitude** to obtain an outside air temperature that is less conducive to icing.
- 3. Pull cabin heat control full out and open defroster outlets to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
- 4. Watch for signs of engine-related icing conditions. An unexplained loss in engine speed could be caused by ice blocking the air intake filter, or, in extremely rare instances, ice completely blocking the fuel injection air reference tubes. Change the throttle position to obtain maximum RPM. This may require either advancing or retarding the throttle, dependent on where ice has accumulated in the system. Adjust mixture, as required, for maximum RPM.
- 5. Plan a landing at the nearest airport. With an extremely rapid ice build up, select a suitable "off airport" landing site.
- 6. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher stall speed and a longer landing roll.
- 7. Leave wing flaps retracted. With a severe ice build up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
- 8. Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
- 9. Perform a landing approach using a forward slip, if necessary, for improved visibility.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

AMMETER SHOWS EXCESSIVE RATE OF CHARGE (Full Scale Deflection)

1. Alternator -- OFF.

A CAUTION

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25° MAY OCCUR.

- 2. Nonessential Electrical Equipment -- OFF.
- 3. Flight -- TERMINATE as soon as practical.

LOW VOLTAGE ANNUNCIATOR (VOLTS) ILLUMINATES DURING FLIGHT (Ammeter Indicates Discharge)

NOTE

Illumination of "VOLTS" on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the annunciator will go out at higher RPM. The master switch need not be recycled since an overvoltage condition has not occurred to deactivate the alternator system.

- 1. Avionics Master Switch -- OFF.
- 2. Alternator Circuit Breaker (ALT FLD) -- CHECK IN.
- 3. Master Switch -- OFF (both sides).
- 4. Master Switch -- ON.
- 5. Low Voltage Annunciator (VOLTS) -- CHECK OFF.
- 6. Avionics Master Switch -- ON.

If low voltage annunciator (VOLTS) illuminates again:

- 7. Alternator -- OFF.
- 8. Nonessential Radio and Electrical Equipment -- OFF.
- 9. Flight -- TERMINATE as soon as practical.

3-11

AMPLIFIED EMERGENCY PROCEDURES

The following Amplified Emergency Procedures elaborate upon information contained in the Emergency Procedures Checklists portion of this section. These procedures also include information not readily adaptable to a checklist format, and material to which a pilot could not be expected to refer in resolution of a specific emergency. This information should be reviewed in detail prior to flying the airplane, as well as reviewed on a regular basis to keep pilot's knowledge of procedures fresh.

ENGINE FAILURE

If an engine failure occurs during the takeoff roll, the most important thing to do is stop the airplane on the remaining runway. Those extra items on the checklist will provide added safety after a failure of this type.

Prompt lowering of the nose to maintain airspeed and establish a glide attitude is the first response to an engine failure after takeoff. In most cases, the landing should be planned straight ahead with only small changes in direction to avoid obstructions. Altitude and airspeed are seldom sufficient to execute a 180° gliding turn necessary to return to the runway. The checklist procedures assume that adequate time exists to secure the fuel and ignition systems prior to touchdown.

FORCED LANDINGS

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing as discussed under the Emergency Landing Without Engine Power checklist. Transmit Mayday message on 121.5 MHz giving location and intentions and squawk 7700.

Before attempting an "off airport" landing with engine power available, one should fly over the landing area at a safe but low altitude to inspect the terrain for obstructions and surface conditions, proceeding as discussed under the Precautionary Landing With Engine Power checklist.

Prepare for ditching by securing or jettisoning heavy objects located in the baggage area and collect folded coats for protection of occupants' face at touchdown. Transmit Mayday message on 121.5 MHz giving location and intentions and squawk 7700. Avoid a landing flare because of difficulty in judging height over a water surface. The checklist assumes the availability of power to make a precautionary water landing. If power is not available, use of the airspeeds noted with minimum flap extension will provide a more favorable attitude for a power off ditching.

In a forced landing situation, do not set the AVIONICS MASTER switch or the airplane MASTER switch to the OFF position until a landing is assured. When these switches are in the OFF position, the airplane electrical systems are de-energized.

Before performing a forced landing, especially in remote and mountainous areas, activate the ELT transmitter by positioning the cockpit-mounted switch to the ON position. For complete information on ELT operation, refer to the Supplements, Section 9.

LANDING WITHOUT ELEVATOR CONTROL

Trim for horizontal flight (with an airspeed of approximately 65 KIAS and flaps set to 20°) by using throttle and elevator trim controls. Then **do not change the elevator trim control setting**; control the glide angle by adjusting power exclusively.

- 3. Check accuracy of the turn by observing the compass heading which should be the reciprocal of the original heading.
- 4. If necessary, adjust heading primarily with skidding motions rather than rolling motions so that the compass will read more accurately.
- Maintain altitude and airspeed by cautious application of elevator control. Avoid over controlling by keeping the hands off the control wheel as much as possible and steering only with rudder.

EMERGENCY DESCENT THROUGH CLOUDS

If conditions prevent return to VFR flight using a 180° turn, a descent through a cloud deck to VFR conditions may be appropriate. If possible, obtain radio clearance for an emergency descent through clouds. To guard against a spiral dive, choose an easterly or westerly heading to minimize compass card swings due to changing bank angles. In addition, keep hands off the control wheel and steer a straight course with rudder control by monitoring the turn coordinator. Occasionally check the compass heading and make minor corrections to hold an approximate course. Before descending into the clouds, set up a stabilized letdown condition as follows:

- 1. Apply full rich mixture.
- 2. Reduce power to set up a 500 to 800 ft/min rate of descent.
- 3. Adjust the elevator trim for a stabilized descent at 70-80 KIAS.
- 4. Keep hands off the control wheel.
- Monitor turn coordinator and make corrections by rudder alone.
- 6. Check trend of compass card movement and make cautious corrections with rudder to stop the turn.
- 7. Upon breaking out of clouds, resume normal cruising flight.

When using the alternate static source, refer to the Alternate Static Source Airspeed Calibration table in Section 5, Performance, for additional information.

Maximum airspeed and altimeter variation from normal is 4 knots and 30 feet over the normal operating range with the window(s) closed. See Section 5, Performance, for additional airspeed calibration data.

SPINS

Should an inadvertent spin occur, the following recovery procedure should be used:

- 1. RETARD THROTTLE TO IDLE POSITION.
- 2. PLACE AILERONS IN NEUTRAL POSITION.
- 3. APPLY AND **HOLD** FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
- 4. JUST AFTER THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL BRISKLY FORWARD FAR ENOUGH TO BREAK THE STALL. Full down elevator may be required at aft center of gravity loadings to assure optimum recoveries.
- HOLD THESE CONTROL INPUTS UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
- 6. AS ROTATION STOPS, NEUTRALIZE RUDDER, AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

NOTE

If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator may be referred to for this information.

For additional information on spins and spin recovery, see the discussion under SPINS in Normal Procedures (Section 4).

EXCESSIVE FUEL VAPOR INDICATIONS

Excessive fuel vapor is most likely to be generated during ground operations when operating at higher altitudes, in unusually warm temperatures or with more volatile fuel blends. Operation at or near idle RPM (low fuel flow) for extended periods will increase the chances of fuel vapor generation. (See "Leaning For Ground Operations", Section 4.)

Indicated fuel flow that is not stable (sudden changes greater than 1 gal/hr) is a sign that fuel vapor may be present in the system. Fuel flow indications that become less stable (increasing changes) may lead to power surges and power loss if not corrected.

If in-flight vapor is suspected, smoother engine operation may result from making the following changes (singly or together): set the auxiliary fuel pump switch to the ON position, lean the mixture for smooth engine operation and select another fuel tank. Increasing the airspeed to provide more air flow through the cowling will aid in cooling the engine and fuel system components.

LOW OIL PRESSURE

If the low oil pressure annunciator (OIL PRESS) illuminates and oil temperature remains normal, the oil pressure sending unit or relief valve may be malfunctioning. Land at the nearest airport to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot.

AD 2001-06-17

(3) Add the following information to the end of page 3-20, Section 3 Emergency Procedures of the Cessna 172R or 172S Pilot's Operating Handbook (POH) and FAA-approved Airplane Flight Manual (AFM):

"IDLE POWER ENGINE ROUGHNESS

An excessively rich idle fuel flow may cause low speed engine roughness during flight. During most in-flight low engine speeds (power off stalls, approach to landing, etc.), the mixture control is normally in the full-rich position. However, to improve engine roughness (caused by an improperly adjusted fuel servo) during low engine speeds while in flight, you should rotate the vernier mixture control (leaning of fuel mixture). You may also have to lean the fuel mixture if this low engine speed results in power loss and you need to restart the engine during flight. In all cases, you should land the airplane at the nearest airport for repairs if low speed engine roughness requires you to adjust the fuel mixture control to improve engine operation."

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If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot.

INSUFFICIENT RATE OF CHARGE

NOTE

The low voltage annunciator (VOLTS) may come on and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the annuciator will go off at higher RPM.

If the overvoltage sensor should shut down the alternator and trip the alternator circuit breaker (ALT FLD), or if the alternator output is low, a discharge rate will be shown on the ammeter followed by illumination of the low voltage annunciator (VOLTS). Since this may be a "nuisance" trip out, an attempt should be made to reactivate the alternator system. To reactivate, set the avionics master switch to the OFF position, check that the alternator circuit breaker (ALT FLD) is in, then set both sides of the master switch to the OFF position and then to the ON position. If the problem no longer exists, normal alternator charging will resume and the low voltage annunciator (VOLTS) will go off. The avionics master switch may then be returned to the ON position.

If the annunciator illuminates again, a malfunction is confirmed. In this event, the flight should be terminated and/or the current drain on the battery minimized because the battery can supply the electrical system for only a limited period of time. Battery power must be conserved for later operation of the wing flaps and, if the emergency occurs at night, for possible use of the landing lights during landing.

OTHER EMERGENCIES

WINDSHIELD DAMAGE

If a bird strike or other incident should damage the windshield in flight to the point of creating an opening, a significant loss in performance may be expected. This loss may be minimized in some cases (depending on amount of damage, altitude, etc.) by opening the side windows while the airplane is maneuvered for a landing at the nearest airport. If airplane performance or other adverse conditions preclude landing at an airport, prepare for an "off airport" landing in accordance with the Precautionary Landing With Engine Power or Ditching checklists.

Revision 7 3-23/3-24

SAFETY WARNING

Vacuum / Pressure Gyroscopic Flight Instrument Power System

ATTENTION: MECHANIC/SERVICE FACILITY

This important notice must be given to the Owner/ Operator of the aircraft into which this air pump is installed. FAILURE TO DO SO MAY RESULT IN DEATH, BODILY INJURY, OR PROPERTY DAMAGE.

ATTENTION: AIRCRAFT OWNER/OPERATOR

This important notice must be (1) read and understood and followed before operating the aircraft into which this air pump is installed, (2) distributed to all pilots using the aircraft, and (3) permanently retained in the Pilot's Operating Handbook for this aircraft. FAILURE TO DO SO MAY RESULT IN DEATH, BODILY INJURY, OR PROPERTY DAMAGE.

Parker Aerospace

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SECTION 4 NORMAL PROCEDURES

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INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in the Supplements, Section 9.

AIRSPEEDS

AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 2450 pounds and may be used for any lesser weight.

Takeoff: Normal Climb Out	0-80 KIAS 57 KIAS
	5-85 KIAS
	0-80 KIAS
Best Rate-of-Climb, Sea Level	79 KIAS
Best Rate-of-Climb, 10,000 Feet	71 KIAS
Best Angle-of-Climb, Sea Level	60 KIAS
Best Angle-of-Climb, 10,000 Feet	65 KIAS
Landing Approach:	
	5-75 KIAS
	0-70 KIAS
Short Field Approach, Flaps 30°	62 KIAS
Balked Landing:	
Maximum Power, Flaps 20°	55 KIAS
Maximum Recommended Turbulent Air Penetration Speed:	
2450 Lbs	99 KIAS
2000 Lbs	92 KIAS
1600 Lbs	82 KIAS
Maximum Demonstrated Crosswind Velocity:	
Takeoff or Landing	5 KNOTS

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

(1) CABIN

- 1. Pitot Tube Cover -- REMOVE. Check for pitot blockage.
- 2. Pilot's Operating Handbook -- AVAILABLE IN THE AIRPLANE.
- 3. Airplane Weight and Balance -- CHECKED.
- 4. Parking Brake -- SET.
- 5. Control Wheel Lock -- REMOVE.
- 6. Ignition Switch -- OFF.
- 7. Avionics Master Switch -- OFF.

A WARNING

WHEN TURNING ON THE MASTER SWITCH, USING AN EXTERNAL POWER SOURCE, OR PULLING THE PROPELLER THROUGH BY HAND, TREAT THE PROPELLER AS IF THE IGNITION SWITCH WERE ON. DO NOT STAND, NOR ALLOW ANYONE ELSE TO STAND, WITHIN THE ARC OF THE PROPELLER, SINCE A LOOSE OR BROKEN WIRE OR A COMPONENT MALFUNCTION COULD CAUSE THE PROPELLER TO ROTATE.

- 8. Master Switch -- ON.
- 9. Fuel Quantity Indicators -- CHECK QUANTITY and ENSURE LOW FUEL ANNUNCIATORS (L LOW FUEL R) ARE EXTINGUISHED.
- 10. Avionics Master Switch -- ON.
- 11. Avionics Cooling Fan -- CHECK AUDIBLY FOR OPERATION.
- 12. Avionics Master Switch -- OFF.
- 13. Static Pressure Alternate Source Valve -- OFF.
- 14. Annunciator Panel Switch -- PLACE AND HOLD IN TST POSITION and ensure all annunciators illuminate.

- 2. Main Wheel Tire -- CHECK for proper inflation and general condition (weather checks, tread depth and wear, etc...).
- 3. Fuel Tank Sump Quick Drain Valves -- DRÁIN at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to WARNING below and do not fly airplane.

A WARNING

IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.

- 4. Fuel Quantity -- CHECK VISUALLY for desired level.
- 5. Fuel Filler Cap -- SECURE and VENT UNOBSTRUCTED.

5 NOSE

1. Fuel Strainer Quick Drain Valve (Located on bottom of fuselage) -- DRAIN at least a cupful of fuel (using sampler cup) from valve to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points, including the fuel reservoir and fuel selector, until all contamination has been removed. If contaminants are still present, refer to WARNING above and do not fly the airplane.

(7) LEFT WING Leading Edge

- Fuel Tank Vent Opening -- CHECK for blockage.
 Stall Warning Opening -- CHECK for blockage. To check the system, place a clean handkerchief over the vent opening and apply suction; a sound from the warning horn will confirm system operation.
- 3. Wing Tie-Down -- DISCONNECT.
- 4. Landing/Taxi Light(s) -- CHECK for condition and cleanliness of cover.

(8) LEFT WING Trailing Edge

- 1. Aileron-- CHECK for freedom of movement and security.
- 2. Flap -- CHECK for security and condition.

BEFORE STARTING ENGINE

- 1. Preflight Inspection -- COMPLETE.
- 2. Passenger Briefing -- COMPLETE.
- 3. Seats and Seat Belts -- ADJUST and LOCK. Ensure inertia reel locking.
- 4. Brakes -- TEST and SET.
- 5. Circuit Breakers -- CHECK IN.
- 6. Electrical Equipment -- OFF.

A CAUTION

THE AVIONICS MASTER SWITCH MUST BE OFF **DURING ENGINE START** TO PREVENT POSSIBLE DAMAGE TO AVIONICS.

- 7. Avionics Master Switch -- OFF.
- 8. Fuel Selector Valve -- BOTH.
- 9. Fuel Shutoff Valve -- ON (push full in).
- Avionics Circuit Breakers -- CHECK IN.

Temporary Revision for Cessna Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

Publication Affected: Model 172R (172RPHUS09), 172R180

(172R180PHUS03), and 172S (172SPHUS05) Pilot's Operating Handbook and FAA Approved Airplane

Flight Manual.

Serial Numbers Affected: Airplanes 17280001 and On and

172S8001 and On not incorporating the Nav III Avionics Option (G1000).

Description of Change: New Idle Power Engine Roughness

Information (As Required by AD 2001-

06-17, Paragraph (d)(3)).

Filing Instructions: Insert this temporary revision in Model

172R (172RPHUS09), 172R180 (172R180PHUS03), and 172S (172SPHUS05) Pilot's Operating Handbook and FAA Approved Airplane Flight Manual adjacent to page 3-20.

Removal Instructions: This temporary revision must be

removed and discarded when the Idle Power Engine Roughness Information

has been incorporated.

IDLE POWER ENGINE ROUGHNESS (As Required by AD 2001-06-17, Paragraph (d)(3))

An excessively rich idle fuel flow may cause low speed engine roughness during flight. During most in-flight low engine speeds (power off stalls, approach to landing, etc.), the mixture control is normally in the full-rich position. However, to improve engine roughness (caused by an improperly adjusted fuel servo) during low engine speeds while in flight, you should rotate the vernier mixture control (leaning of fuel mixture). You may also have to lean the fuel mixture if this low engine speed results in power loss and you need to restart the engine during flight. In all cases, you should land the airplane at the nearest airport for repairs if low speed engine roughness requires you to adjust the fuel mixture control to improve engine operation.

(Continued Next Page)

Temporary Revision for Cessna Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

APPROVED BY

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DATE OF APPROVAL

172PHTR02

Temporary Revision for Cessna Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

Publication Affected:

Model 172R, 172R180, and 172S

Pilot's Operating Handbook and FAA

Approved Airplane Flight Manual.

Serial Numbers Affected:

Airplanes

not

incorporating

SB04-24-01.

Description of Change:

New Starting Engine Procedure.

Filing Instructions:

Insert this temporary revision in Model 172R, 172R180, and 172S Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

adjacent to page 4-12.

Removal Instructions:

This temporary revision must be removed and discarded when SB04-24-01 has been incorporated.

STARTING ENGINE

1. Throttle -- OPEN 1/4 INCH.

- 2. Mixture -- IDLE CUTOFF.
- 3. Propeller Area -- CLEAR.
- 4. BAT Side Master Switch -- ON.
- 5. ALT Side Master Switch -- CHECK OFF.
- 6. Flashing Beacon -- ON.

NOTE

If engine is warm, omit priming procedure of steps 7, 8, and 9 below.

7. Auxiliary Fuel Pump Switch -- ON.

- 8. Mixture -- SET to FULL RICH (full forward) until stable fuel flow is indicated (usually 3 to 5 seconds), then set to IDLE CUTOFF (full aft) position.
- 9. Auxiliary Fuel Pump Switch -- OFF.

10. Ignition Switch -- START (release when engine starts).

11. Mixture -- ADVANCE smoothly to RICH when engine starts.

(Continued Next Page)

STARTING ENGINE (With External Power)

- 1. Throttle -- OPEN 1/4 INCH.
- 2. Mixture -- IDLE CUTOFF.
- 3. Propeller Area -- CLEAR.
- 4. Master Switch -- OFF.
- 5. External Power -- CONNECT to airplane receptacle.
- 6. Master Switch -- ON.
- 7. Flashing Beacon -- ON.

NOTE

If engine is warm, omit priming procedure of steps 8, 9, and 10 below.

- 8. Auxiliary Fuel Pump Switch -- ON.
- Mixture -- SET to FULL RICH (full forward) until stable fuel flow is indicated (usually 3 to 5 seconds), then set to IDLE CUTOFF (full aft) position.
- 10. Auxiliary Fuel Pump Switch -- OFF.
- 11. Ignition Switch -- START (release when engine starts).
- 12. Mixture -- ADVANCE smoothly to RICH when engine starts.

NOTE

If engine floods (engine has been primed too much), turn off auxiliary fuel pump, set mixture to idle cutoff, open throttle 1/2 to full, and motor (crank) engine. When engine starts, set mixture to full rich and close throttle promptly.

- 13. Oil Pressure -- CHECK.
- 14. External Power -- DISCONNECT from airplane receptacle. Secure external power door.
- 15. Electrical System -- CHECK FOR PROPER OPERATION.
 - a. Master Switch -- OFF
 (disconnects both the battery and alternator from the system).

AD 2001-06-17

(4) Insert the following information into the applicable Cessna Pilot's Operating Handbook (POH) and FAA-approved Airplane Flight Manual (AFM):

"NORMAL PROCEDURES (Before Takeoff) item 13. Throttle: 1. Verify smooth engine operation at idle speed of 575 to 625 RPM. 2. 1000 RPM or LESS"

BEFORE TAKEOFF

- 1. Parking Brake -- SET.
- 2. Passenger Seat Backs -- MOST UPRIGHT POSITION.
- 3. Seats and Seat Belts -- CHECK SECURE.
- 4. Cabin Doors -- CLOSED and LOCKED.
- 5. Flight Controls -- FREE and CORRECT.
- 6. Flight Instruments -- CHECK and SET.
- 7. Fuel Quantity -- CHECK.
- 8. Mixture -- RICH.
- 9. Fuel Selector Valve -- RECHECK BOTH.
- 10. Throttle -- 1800 RPM.
 - a. Magnetos -- CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
 - b. Vacuum Gage -- CHECK.
 - c. Engine Instruments and Ammeter -- CHECK.
- 11. Annunciator Panel -- Ensure no annunciators are illuminated.
- 12. Throttle -- CHECK IDLE.
- 13. Throttle -- 1000 RPM or LESS.
- 14. Throttle Friction Lock -- ADJUST.
- 15. Strobe Lights -- AS DESIRED.
- 16. Radios and Avionics -- SET.
- 17. NAV/GPS Switch (if installed) -- SET.
- 18. Autopilot (if installed) -- OFF.
- 19. Manual Electric Trim (if installed) -- CHECK.
- 20. Elevator Trim -- SET for takeoff.
- 21. Wing Flaps -- SET for takeoff (0°-10°).
- 22. Brakes -- RELEASE.

TAKEOFF

NORMAL TAKEOFF

- 1. Wing Flaps -- 0°-10°.
- 2. Throttle -- FULL OPEN.
- 3. Mixture -- RICH (above 3000 feet, LEAN to obtain maximum RPM).
- 4. Elevator Control -- LIFT NOSE WHEEL (at 55 KIAS).
- 5. Climb Speed -- 70-80 KIAS.
- 6. Wing Flaps -- RETRACT.

LANDING

NORMAL LANDING

- 1. Airspeed -- 65-75 KIAS (flaps UP).
- 2. Wing Flaps -- AS DESIRED (0°-10° below 110 KIAS, 10°-30° below 85 KIAS).
- 3. Airspeed -- 60-70 KIAS (flaps DOWN).
- 4. Touchdown -- MAIN WHEELS FIRST.
- 5. Landing Roll -- LOWER NOSE WHEEL GENTLY.
- 6. Braking -- MINIMUM REQUIRED.

SHORT FIELD LANDING

- 1. Airspeed -- 65-75 KIAS (flaps UP).
- 2. Wing Flaps -- FULL DOWN (30°).
- 3. Airspeed -- 62 KIAS (until flare).
- 4. Power -- REDUCE to idle after clearing obstacle.
- 5. Touchdown -- MAIN WHEELS FIRST.
- 6. Brakes -- APPLY HEAVILY.
- 7. Wing Flaps -- RETRACT.

BALKED LANDING

- 1. Throttle -- FULL OPEN.
- 2. Wing Flaps -- RETRACT TO 20°.
- 3. Climb Speed -- 55 KIAS.
- Wing Flaps -- 10° (until obstacles are cleared).
 RETRACT (after reaching a safe altitude and 60 KIAS).

AFTER LANDING

1. Wing Flaps -- UP.

SECURING AIRPLANE

- 1. Parking Brake -- SET.
- 2. Electrical Equipment, Autopilot (if installed) -- OFF.
- 3. Avionics Master Switch -- OFF.
- 4. Mixture -- IDLE CUT OFF (pulled full out).
- 5. Ignition Switch -- OFF.
- 6. Master Switch -- OFF.
- 7. Control Lock -- INSTALL.
- 8. Fuel Selector Valve -- LEFT or RIGHT to prevent cross feeding.

If the airplane has been operated from muddy fields or in snow or slush, check the main and nose gear wheel fairings for obstructions and cleanliness. Operation from a gravel or cinder field will require extra attention to propeller tips and abrasion on leading edges of the horizontal tail. Stone damage to the propeller can seriously reduce the fatigue life of the blades.

Airplanes that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. Frequently check all components of the landing gear, shock strut, tires, and brakes. If the shock strut is insufficiently extended, undue landing and taxi loads will be subjected on the airplane structure.

To prevent loss of fuel in flight, make sure the fuel tank filler caps are tightly sealed after any fuel system check or servicing. Fuel system vents should also be inspected for obstructions, ice or water, especially after exposure to cold, wet weather.

STARTING ENGINE

In cooler weather, the engine compartment temperature drops off rapidly following engine shutdown and the injector nozzle lines remain nearly full of fuel.

However, in warmer weather, engine compartment temperatures may increase rapidly following engine shutdown, and fuel in the lines will vaporize and escape into the intake manifold. Hot weather starting procedures depend considerably on how soon the next engine start is attempted. Within the first 20 to 30 minutes after shutdown, the fuel manifold is adequately primed and the empty injector nozzle lines will fill before the engine dies. However, after approximately 30 minutes, the vaporized fuel in the manifold will have nearly dissipated and some slight "priming" could be required to refill the nozzle lines and keep the engine running after the initial start. Starting a hot engine is facilitated by advancing the mixture control promptly to 1/3 open when the engine starts, and then smoothly to full rich as power develops.

LEANING FOR GROUND OPERATIONS

- 1. For all ground operations, after starting the engine and when the engine is running smoothly:
 - a. set the throttle to 1200 RPM.
 - b. lean the mixture for maximum RPM.
 - c. set the throttle to an RPM appropriate for ground operations (800 to 1000 RPM recommended)

NOTE

If ground operation will be required after the BEFORE TAKEOFF checklist is completed, lean the mixture again (as described above) until ready for the TAKEOFF checklist.

TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (Refer to Figure 4-2, Taxiing Diagram) to maintain directional control and balance.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

BEFORE TAKEOFF

WARM UP

If the engine idles (approximately 600 RPM) and accelerates smoothly, the airplane is ready for takeoff. Since the engine is closely cowled for efficient in-flight engine cooling, precautions should be taken to avoid overheating during prolonged engine operation on the ground. Also, long periods of idling may cause fouled spark plugs.

MAGNETO CHECK

The magneto check should be made at 1800 RPM as follows. Move ignition switch first to R position and note RPM. Next move switch back to BOTH to clear the other set of plugs. Then move switch to the L position, note RPM and return the switch to the BOTH position. RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

ALTERNATOR CHECK

Prior to flights where verification of proper alternator and alternator control unit operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light or by operating the wing flaps during the engine runup (1800 RPM). The ammeter will remain within a needle width of its initial reading if the alternator and alternator control unit are operating properly.

WING FLAP SETTINGS

Normal takeoffs are accomplished with wing flaps 0°-10°. Using 10° wing flaps reduces the ground roll and total distance over an obstacle by approximately 10 percent. Flap deflections greater than 10° are not approved for takeoff. If 10° wing flaps are used for takeoff, they should be left down until all obstacles are cleared and a safe flap retraction speed of 60 KIAS is reached. On a short field, 10° wing flaps and an obstacle clearance speed of 57 KIAS should be used.

Soft or rough field takeoffs are performed with 10° flaps by lifting the airplane off the ground as soon as practical in a slightly tail low attitude. If no obstacles are ahead, the airplane should be leveled off immediately to accelerate to a higher climb speed. When departing a soft field with an aft C.G. loading, the elevator trim should be adjusted towards the nose down direction to give comfortable control wheel forces during the initial climb.

CROSSWIND TAKEOFF

Takeoffs into strong crosswind conditions normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after takeoff. With the ailerons partially deflected into the wind, the airplane is accelerated to a speed slightly higher than normal, then pulled off briskly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

ENROUTE CLIMB

Normal enroute climbs are performed with flaps up and **full throttle** and at speeds 5 to 10 knots higher than best rate-of-climb speeds for the best combination of performance, visibility and engine cooling. The mixture should be **full rich** below 3000 feet and may be leaned above 3000 feet for smoother operation or to obtain maximum RPM. For maximum rate of climb, use the best rate-of-climb speeds shown in the Rate of Climb chart in Section 5. If an obstruction dictates the use of a steep climb angle, the best angle-of-climb speed should be used with flaps up and maximum power. Climbs at speeds lower than the best rate-of-climb speed should be of short duration to improve engine cooling.

	80% P	OWER	70% P	OWER	60% POWER		
ALTITUDE	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG	
Sea Level	113	12.3	108	13.4	100	14.5	
4000 feet	117	12.8	111	13.9	103	14.9	
8000 feet	122	13.3	115	14.3	105	15.3	

Figure 4-3. Cruise Performance Table

LEANING USING THE EGT INDICATOR

At or below 80% power in level cruise flight, the exhaust gas temperature (EGT) indicator is used to lean the fuel-air mixture for best performance or economy. The Cruise Performance charts in Section 5 are based on the EGT to adjust the mixture to Recommended Lean per Figure 4-4.

MIXTURE DESCRIPTION	EXHAUST GAS TEMPERATURE
RECOMMENDED LEAN (Pilot's Operating Handbook)	50° Rich of Peak EGT
BEST ECONOMY	Peak EGT

Figure 4-4. EGT Table

Use the mixture control vernier adjustment (rotate the knob CCW to lean the mixture) to **slowly** lean, from full rich or maximum RPM mixture, while monitoring the EGT indicator. As the EGT indication begins to increase, continue to **slowly** lean the mixture until an EGT indication decrease is just detectable. Reverse the adjustment **slowly** in the rich direction until an EGT indication decrease is again just detectable, then set the EGT index pointer to match the peak indication. The mixture may be leaned slightly to return to peak EGT or may be further richened to Recommended Lean mixture as desired. **Continuous operation at mixture settings lean of peak EGT is prohibited.** Any change in altitude or throttle position will require that peak EGT be redetermined and the desired mixture be reset. Under some conditions, engine roughness may occur at peak EGT. In this case, operate at Recommended Lean mixture.

As noted in Figure 4-4, operation at peak EGT provides the best fuel economy. Operatoion at peak EGT results in approximately 4% greater range and approximately a 3 knot decrease in airspeed from the figures shown in the Performance section of this handbook. Recommended Lean mixture provides best level cruise performance (generally close to "best power" or maximum RPM).

FUEL VAPOR PROCEDURES

The engine fuel system can become susceptible to fuel vapor formation on the ground during warm weather. This will generally occur when the outside ambient air temperature is above 80°F. The situation is further aggravated by the fact that the engine fuel flows are lower at idle and taxi engine speeds. When vapor occurs as evidenced by idle engine speed and fuel flow fluctuations, the following procedures are recommended.

- 1. With the mixture full rich, set the throttle at 1800 RPM to 2000 RPM. Maintain this power setting for 1 to 2 minutes or until smooth engine operation returns.
- 2. Retard the throttle to idle to verify normal engine operation.
- Advance the throttle to 1200 RPM and lean the mixture as described under FUEL SAVINGS PROCEDURES FOR FLIGHT TRAINING OPERATIONS.
- 4. Just prior to TAKEOFF, apply full throttle, for approximately 10 seconds to verify smooth engine operation for takeoff.

NOTE

When the engine is operated above 1800 RPM, the resulting increased fuel flow also makes for lower fuel temperatures throughout the engine fuel system. This increased flow purges the fuel vapor and the cooler fuel minimizes vapor formation.

In addition to the above procedures, the sections below should be reviewed and where applicable, adhered to:

- Section 2 -- Take note of the placard on "When Switching From Dry Tank".
- Section 3 -- Take note of the excessive fuel vapor procedures in both the checklist and the amplified procedures sections.
- Section 4 -- Take note of the hot weather operational notes and procedures in both the checklist and the amplified procedures sections.
- Section 7 -- Take note of the altitude operational procedures and the section on auxiliary fuel pump operation.

The normal entry is made from a power off stall. As the stall is approached, the elevator control should be smoothly pulled to the full aft position. Just prior to reaching the stall "break", rudder control in the desired direction of the spin rotation should be applied so that full rudder deflection is reached almost simultaneously with reaching full aft elevator. A slightly greater rate of deceleration than for normal stall entries, application of ailerons in the direction of the desired spin, and the use of power at the entry will assure more consistent and positive entries to the spin. As the airplane begins to spin, reduce the power to idle and return the ailerons to neutral. Both elevator and rudder controls should be held full with the spin until the spin recovery is initiated. An inadvertent relaxation of either of these controls could result in the development of a nose down spiral.

For the purpose of training in spins and spin recoveries, a 1 or 2 turn spin is adequate and should be used. Up to 2 turns, the spin will progress to a fairly rapid rate of rotation and a steep attitude. Application of recovery controls will produce prompt recoveries (within 1/4 turn). During extended spins of two to three turns or more, the spin will tend to change into a spiral, particularly to the right. This will be accompanied by an increase in airspeed and gravity loads on the airplane. If this occurs, recovery should be accomplished promptly but smoothly by leveling the wings and recovering from the resulting dive.

Regardless of how many turns the spin is held or how it is entered, the following recovery technique should be used:

- 1. VERIFY THAT THROTTLE IS IN IDLE POSITION AND AILERONS ARE NEUTRAL.
- APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
- 3. JUST **AFTER** THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL **BRISKLY** FORWARD FAR ENOUGH TO BREAK THE STALL.
- 4. **HOLD** THESE CONTROL INPUTS UNTIL ROTATION STOPS.
- 5. AS ROTATION STOPS, NEUTRALIZE RUDDER, AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

SHORT FIELD LANDING

For a short field landing in smooth air conditions, make an approach at 62 KIAS with 30° flaps using enough power to control the glide path. (Slightly higher approach speeds should be used under turbulent air conditions.) After all approach obstacles are cleared, progressively reduce power and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made with power off and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply heavy braking as required. For maximum brake effectiveness, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without sliding the tires.

CROSSWIND LANDING

When landing in a strong crosswind, use the minimum flap setting required for the field length. If flap settings greater than 20° are used in sideslips with full rudder deflection, some elevator oscillation may be felt at normal approach speeds. However, this does not affect control of the airplane. Although the crab or combination method of drift correction may be used, the wing low method gives the best control. After touchdown, hold a straight course with the steerable nose wheel and occasional braking if necessary.

The maximum allowable crosswind velocity is dependent upon pilot capability as well as airplane limitations. Operation in direct crosswinds of 15 knots has been demonstrated.

BALKED LANDING

In a balked landing (go-around) climb, reduce the flap setting to 20° immediately after full power is applied. If obstacles must be cleared during the go-around climb, reduce the wing flap setting to 10° and maintain a safe airspeed until the obstacles are cleared. Above 3000 feet, lean the mixture to obtain maximum RPM. After clearing any obstacles, the flaps may be retracted as the airplane accelerates to the normal flaps up climb speed.

When using an external power source, the master switch must be in the OFF position before connecting the external power source to the airplane receptacle. See Section 7, Ground Service Plug Receptacle for external power source operations.

Cold weather starting procedures are the same as the normal starting procedures. Use caution to prevent inadvertent forward movement of the airplane during starting when parked on snow or ice.

NOTE

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, it is probable that the spark plugs have been frosted over. Preheat must be used before another start is attempted.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to takeoff if outside air temperatures are very cold. After a suitable warm up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher engine RPM. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for takeoff.

WINTERIZATION KIT

A winterization kit is provided and may be utilized when cold weather operations are conducted.

SECTION 5 PERFORMANCE

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INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions, and also, to facilitate the planning of flights in detail and with reasonable accuracy. The data in the charts has been computed from actual flight tests with the airplane and engine in good condition and approximating average piloting techniques.

It should be noted that performance information presented in the range and endurance profile charts allows for 45 minutes reserve fuel at the specified power setting. Fuel flow data for cruise is based on the recommended lean mixture setting at all altitudes. Some indeterminate variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight and to flight plan in a conservative manner.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

SAMPLE PROBLEM

The following sample flight problem utilizes information from the various charts to determine the predicted performance data for a typical flight. Assume the following information has already been determined:

AIRPLANE CONFIGURATION:

Takeoff weight 2450 Pounds Usable fuel 53 Gallons

TAKEOFF CONDITIONS:

Field pressure altitude 1500 Feet

Temperature 28°C (16°C Above

Standard)

Wind component along runway 12 Knot Headwind

Field length 3500 Feet

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Total distance to clear a 50-foot obstacle, zero wind Decrease in total distance

2290

(2290 feet X 13%)

-298

Corrected total distance

to clear 50-foot obstacle 19

1992 Feet

CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in Figure 5-8, the range profile chart presented in Figure 5-9, and the endurance profile chart presented in Figure 5-10.

The relationship between power and range is illustrated by the range profile chart. Considerable fuel savings and longer range result when lower power settings are used. For this sample problem, a cruise power of approximately 65% will be used.

The cruise performance chart, Figure 5-8, is entered at 6000 feet pressure altitude and 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The engine speed chosen is 2200 RPM, which results in the following:

Power 64%
True airspeed 109 Knots
Cruise fuel flow 7.3 GPH

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The resultant cruise distance is:

Total distance	320
Climb distance	-12
Cruise distance	3 <u>08</u> nm

With an expected 10 knot headwind, the ground speed for cruise is predicted to be:

109 -10

99 Knots

Therefore, the time required for the cruise portion of the trip is:

The fuel required for cruise is:

3.1 hours X 7.3 gallons/hour = 22.7 Gallons

A 45-minute reserve requires:

$$\frac{45}{60}$$
 X 7.3 gallons / hour = 5.5 Gallons

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	1.1
Climb	1.6
Cruise	22.7
Reserve	<u>5.5</u>

Total fuel required 30.9 Gallons

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

AIRSPEED CALIBRATION

NORMAL STATIC SOURCE

CONDITION:

Power required for level flight or maximum rated RPM dive.

FLAPS UP												
KIAS	50	60	70	80	90	100	110	120	130	140	150	160
KCAS	56	62	70	79	89	98	107	117	126	135	145	154
FLAPS 10°					·							
KIAS	40	50	60	70	80	90	100	110				
KCAS	49	55	62	70	79	89	98	108	-			
FLAPS 30°												
KIAS	40	50	60	70	80	85				-	-	
KCAS	47	53	61	70	80	84	<u>-</u>					

Figure 5-1. Airspeed Calibration (Sheet 1 of 2)

TEMPERATURE CONVERSION CHART

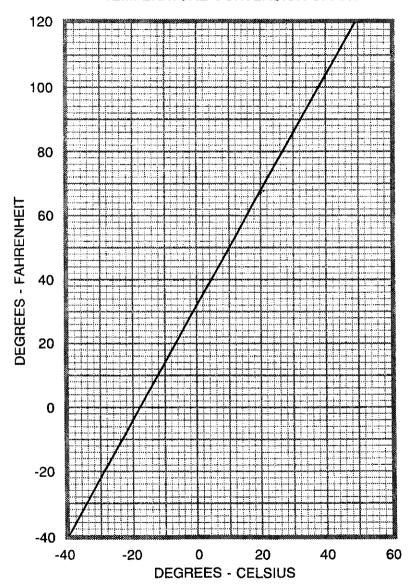
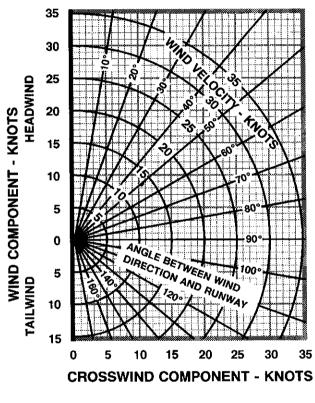


Figure 5-2. Temperature Conversion Chart

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WIND COMPONENTS

NOTE: Maximum demonstrated crosswind velocity is 15 knots (not a limitation).



NOTE

Maximum demonstrated crosswind component is 15 knots (not a limitation).

0585C1003

Figure 5-4. Crosswind Components

MAXIMUM RATE-OF-CLIMB AT 2450 POUNDS

CONDITIONS:

Flaps Up Full Throttle

PRESS	CLIMB	RATE OF CLIMB - FPM							
ALT FT	SPEED KIAS	-20°C	0°C	20°C	40°C				
S.L.	79	830	770	705	640				
2000	77	720	655	595	535				
4000	76	645	585	525	465				
6000	74	530	475	415	360				
8000	72	420	365	310	250				
10,000	71	310	255	200	145				
12,000	69	200	145						

NOTE:

1. Mixture leaned above 3000 feet for maximum RPM.

Figure 5-6. Maximum Rate of Climb

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CRUISE PERFORMANCE

CONDITIONS:

2450 Pounds Recommended Lean Mixture At All Altitudes (Refer to Section 4, Cruise)

PRESS	2014	20°C BELOW STANDARD TEMP				STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
ALT FT	RPM	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH	
2000	2250				79	115	9.0	74	114	8.5	
	2200	79	112	9.1	74	112	8.5	70	111	8.0	
:	2100	69	107	7.9	65	106	7.5	62	105	7.1	
	2000	61	101	7.0	58	99	6.6	55	97	6.4	
	1900	54	94	6.2	51	91	5.9	50	89	5.8	
4000	2300				79	117	9.1	75	117	8.6	
	2250	80	115	9.2	75	114	8.6	70	114	8.1	
į	2200	75	112	8.6	70	111	8.1	66	110	7.6	
	2100	66	106	7.6	62	105	7.1	59	103	6.8	
	2000	58	100	6.7	55	98	6.4	53	95	6.2	
'	1900	52	92	6.0	50	90	5.8	49	87	5.6	
ŀ											
6000	2350				80	120	9.2	75	119	8.6	
	2300	80	117	9.2	75	117	8.6	71	116	8.1	
	2250	76	115	8.7	71	114	8.1	67	113	7.7	
	2200	71	112	8.1	67	111	7.7	64	109	7.3	
	2100	63	105	7.2	60	104	6.9	57	101	6.6	
	2000	56	98	6.4	53	96	6.2	52	93	6.0	

NOTE:

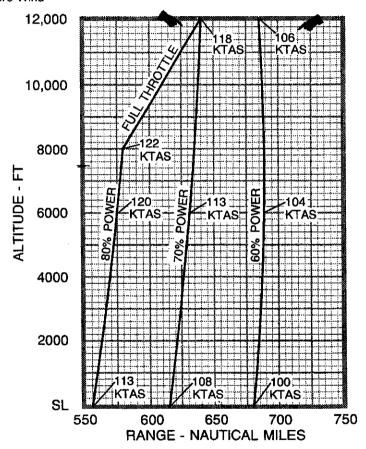
1. Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

Figure 5-8. Cruise Performance (Sheet 1 of 2)

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RANGE PROFILE 45 MINUTES RESERVE 53 GALLONS USABLE FUEL

CONDITIONS: 2450 Pounds Recommended Lean Mixture for Cruise At All Altitudes Standard Temperature Zero Wind



NOTES:

- This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during climb.
- Performance is shown for an airplane equipped with speed fairings, which increase the cruise speeds by approximately two knots.

Figure 5-9. Range Profile

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SHORT FIELD LANDING DISTANCE AT 2450 POUNDS

CONDITIONS:

Flaps 30° Power Off Maximum Braking Paved, level, dry runway Zero Wind Speed at 50 Ft: 62 KIAS

	0°C		10	0°C	20	0°C	30)°C	40	0°C
Press Alt In Feet	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst								
S. L.	525	1250	540	1280	560	1310	580	1340	600	1370
1000	545	1280	560	1310	580	1345	600	1375	620	1405
2000	565	1310	585	1345	605	1375	625	1410	645	1440
3000	585	1345	605	1380	625	1415	650	1445	670	1480
4000	605	1380	630	1415	650	1450	670	1485	695	1520
5000	630	1415	650	1455	675	1490	700	1525	720	1560
6000	655	1455	675	1490	700	1530	725	1565	750	1605
7000	680	1495	705	1535	730	1570	755	1610	775	1650
8000	705	1535	730	1575	755	1615	780	1655	810	1695

NOTES:

- 1. Short field technique as specified in Section 4.
- 2. Decrease distances 10% for each 9 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- 3. For operation on dry, grass runway, increase distances by 45% of the "ground roll" figure.
- 4. If landing with flaps up, increase the approach speed by 7 KIAS and allow for 35% longer distances.

Figure 5-11. Short Field Landing Distance

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SECTION 6 WEIGHT & BALANCE/ EQUIPMENT LIST

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INTRODUCTION

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample forms are provided for reference. Procedures for calculating the weight and moment for various operations are also provided. A comprehensive list of all Cessna equipment available for this airplane is included at the back of this section.

It should be noted that specific information regarding the weight, arm, moment and installed equipment for this airplane as delivered from the factory can only be found in the plastic envelope carried in the back of this handbook.

A WARNING

IT IS THE RESPONSIBILITY OF THE PILOT TO ENSURE THE AIRPLANE IS LOADED PROPERLY. OPERATION OUTSIDE OF PRESCRIBED WEIGHT AND BALANCE LIMITATIONS COULD RESULT IN AN ACCIDENT AND SERIOUS OR FATAL INJURY.

AIRPLANE WEIGHING PROCEDURES

- 1. Preparation:
 - a. Inflate tires to recommended operating pressures.
 - b. Defuel airplane. Refer to the Maintenance Manual.
 - c. Service engine oil as required to obtain a normal full indication (8 quarts on dipstick).
 - d. Move sliding seats to the most forward position.
 - e. Raise flaps to the fully retracted position.
 - f. Place all control surfaces in neutral position.
 - g. Remove all non-required items from airplane.
- 2. Leveling:
 - a. Place scales under each wheel (minimum scale capacity, 500-pounds nose, 1000 pounds each main).
 - b. Deflate the nose tire and/or lower or raise the nose strut to properly center the bubble in the level (Refer to Figure 6-1).

LOCATING CG WITH AIRPLANE ON LANDING GEAR						
FORMUL	FORMULA for Longitudinal CG:					
(X) = (A)-	(NOSE G	EAR NET WEIGHT) ()	X (B)	INCHES = () AFT OF		
(71) - (71)	NOSE AN	ID MAIN LANDING GEAR \	T DATUM			
			_	MEASURING A AND B		
LOCATI	NG PERC	CENT MAC	ſ	MEASURE A AND B PER PILOT'S OPERATING HANDBOOK		
FORMULA	FORMULA for Percent MAC:			INSTRUCTIONS TO ASSIST IN LOCATING CG WITH AIRPLANE WEIGHED ON LANDING GEAR.		
CG Perce	nt MAC =	(CG Arm of Airplane) - 25	.90	WEIGHED ON EARDING GEAR.		
		0.5880		LEVELING PROVISIONS		
				LONGITUDINAL - LEFT SIDE OF TAILCONE AT FS 108.00 & 142.00		

AIRPLANE AS WEIGHED TABLE

POSITION	SCALE READING	SCALE DRIFT	TARE	NET WEIGHT
LEFT SIDE				
RIGHT SIDE				
NOSE				
Al				

BASIC EMPTY WEIGHT AND CENTER-OF-GRAVITY TABLE

ITEM	WEIGHT POUNDS	CG ARM (INCHES)	MOMENT (INCH-POUNDS /1000)
AIRPLANE (CALCULATED OR AS WEIGHED) (INCLUDES ALL UNDRAINABLE FLUIDS AND FULL OIL)			
DRAINABLE UNUSABLE FUEL AT 6.0 POUNDS PER GALLON - (3 GALLONS)	18.0	46.0	0.87
BASIC EMPTY WEIGHT			

Figure 6-1. Airplane Weighing Form (Sheet 2 of 2)

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SAMPLE WEIGHT AND BALANCE RECORD

RUNNING BASIC EMPTY WEIGHT MOMENT /1000 (CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE) PAGE NUMBER WT. (LB.) MDMENT /1000 ARM (IN.) REMOVED (-) WEIGHT CHANGE WT. (LB.) MOMENT /1000 SERIAL NO. APIN (SN.) ADDED (+) WT. (LB.) DESCRIPTION OF ARTICLE OR MODIFICATION AS DELIVERED AIRPLANE MODEL OUT ITEM NO. Z DATE

0585C1009

Figure 6-2. Sample Weight and Balance Record

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LOADING ARRANGEMENTS

- * Pilot or passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parentheses indicate forward and aft limits of occupant center of gravity range.
- ** Arm measured to the center of the areas shown.

- NOTES: 1. The usable fuel C.G. arm for integral tanks is located at station 48.0.
 - 2. The rear cabin wall (approximate station 108) or aft baggage wall (approximate station 142) can be used as convenient interior reference points for determining the location of baggage area fuselage stations.

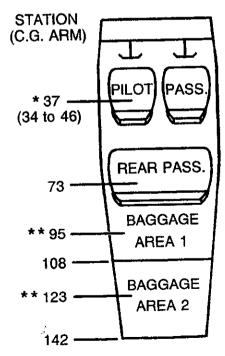
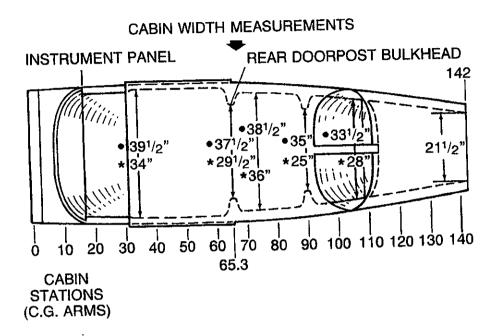


Figure 6-3. Loading Arrangements

0585X1016



- LWR WINDOW LINE
- * CABIN FLOOR

0585X1023

6-11

Figure 6-4. Internal Cabin Dimensions (Sheet 2 of 2)

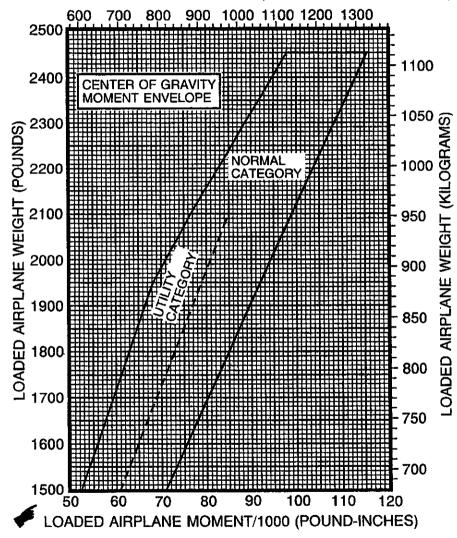
YO AIRP	YOUR AIRPLANE		YOUR AIRPLANE			YO AIRPI	UR _ANE
Weight (lbs.)	Moment (Lb-ins. /1000)	:	Weight (lbs.)	Moment (Lb-ins. /1000)		Weight (lbs.)	Moment (Lb-ins. /1000)
							7
NOTE							

When several loading configurations are representative of your operations, it may be useful to fill out one or more of the above columns so specific loadings are available at a glance.

Figure 6-5. Sample Loading Problem (Sheet 2 of 2)

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0585C1007

Figure 6-7. Center of Gravity Moment Envelope

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COMPREHENSIVE EQUIPMENT LIST

The following figure (Figure 6-9) is a comprehensive list of all Cessna equipment which is available for the Model 172R airplane. This comprehensive equipment list provides the following information in column form:

In the ITEM No. column, each item is assigned a coded number. The first two digits of the code represent the assignment of the item within the Air Transport Association Specification 100 breakdown (11 for Paint and Placards; 24 for Electical Power; 77 for Engine Indicating, etc...). These assignments also correspond to the Maintenance Manual chapter breakdown for the airplane. After the first two digits (and hyphen), items receive a unique sequence number (01, 02, 03, etc...). After the sequence number (and hyphen), a suffix letter is assigned to identify equipment as a required item, a standard item or an optional item. Suffix letters are as follows:

R = required items or equipment for FAA certification

= standard equipment items

O = optional equipment items replacing required or standard items

A = optional equipment items which are in addition to required or standard items

In the EQUIPMENT LIST DESCRIPTION column, each item is assigned a descriptive name to help identify its function.

In the REF DRAWING column, a Cessna drawing number is provided which corresponds to the item.

NOTE

If additional equipment is to be installed, it must be done in accordance with the reference drawing, service bulletin or a separate FAA approval.

In the WT LBS and ARM INS columns, information is provided on the weight (in pounds) and arm (in inches) of the equipment item.

NOTES

Unless otherwise indicated, true values (not net change values) for the weight and arm are shown. Positive arms are distances aft of the airplane datum; negative arms are distances forward of the datum.

Asterisks (") in the weight and arm column indicate complete assembly installations. Some major components of the assembly are listed on the lines immediately following. The sum of these major components does not necessarily equal the complete assembly installation.

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ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
	- AVN GROUND INSTL	3930357	0.2	15.0
	- MISC HARDWARE		0.9	16.0
	24 - ELECTRICAL POWER			
24-01-R	ALTERNATOR, 28 VOLT 60 AMP	9910591-5	10.0	-29.0
24-02-R	BATTERY, 24 VOLT, 12.75 A.H. MANIFOLD TYPE	C614002-0101	23.2	-5.0
24-03-R	POWER JUNCTION BOX (PRECISION AIRMOTIVE)	MC01-2A	6.4*	1.0*
	- ALTERNATOR CONTROL UNIT	AC2101	0.2	1.0
	- MASTER CONTACTOR	X61-0007	0.7	1.0
	- STARTER CONTACTOR	X61-0012	0.7	1.0
	- AMMETER TRANSDUCER	CS 3100	0.1	1.0
24-04-S	BASIC AVIONICS KIT INSTALLATION	3900002-1	3.5*	13.1*
	- AVIONICS POWER AND BUS BAR	3930299-1	0.3	17.0
	25 - EQUIPMENT/FURNISHINGS		5.5	''''
25-01-R	SEAT, PILOT, VERTICAL ADJUST, CLOTH	0514211-1	34.3	41.5
25-02-O	SEAT, PILOT, VERTICAL ADJUST, LEATHER	0514211-5	35.0	41.5
25-03-O	SEAT, PILOT, VERTICAL ADJUST, LEATHER/VINYL	0514211-8	34.8	41.5
25-04-S	SEAT, FRONT PASSENGER, VERTICAL AJUST, CLOTH	0514211-1	34.3	41.5
25-05-O	SEAT, FRONT PASSENGER, VERTICAL AJUST, LEATHER	0514211-5	35.0	41.5
25-06-O	SEAT, FRONT PASSENGER, VERTICAL AJUST, LEATHER/VINYL	0514211-8	34.8	41.5
25-07-S	SEAT, REAR, ONE PIECE BACK CUSHION, CLOTH	0514219-1	43.3	79.5
25-08-O	SEAT, REAR, ONE PIECE BACK CUSHION, LEATHER	0514219-2	44.7	79.5
25-09-O	SEAT, REAR, ONE PIECE BACK CUSHION, LEATHER/VINYL	0514219-3	44.3	79.5
25-10-R	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, PILOT AND FRONT PASSENGER	504516-401- 8013	5.2	54.0
25-11-O	SEAT BELT AND SHOULDER HARNESS, MANUAL ADJUST, PILOT AND FRONT PASSENGER	504851-401- 8013	3.5	54.0
25-11-S	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, REAR SEAT (SET OF 2)	504516-403- 8013	5.2	90.0
25-12-0	SEAT BELT AND SHOULDER HARNESS, MANUAL ADJUST, REAR SEAT (SET OF 2)	504851-403- 8013	3.5	90.0
25-13-S	PADDED GLARESHIELD	0514230-1	1.2	21.0
25-14-S	SUN VISORS	0514166-2	1.1	32.8
25-15-S	BAGGAGE RETAINING NET	2015009-7	0.5	95.0
25-16-S	CARGO TIE DOWN RINGS	0515055-6	0.2	95.0
25-17-S	PILOT'S OPERATING CHECKLIST (STOWED IN INSTRUMENT PANEL MAP CASE)	0500832-1	0.3	14.3

Figure 6-9. Equipment List Description (Sheet 2 of 7)

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
32-03-R	WHEEL AND TIRE, 5.00 X 5 NOSE	0543062-17	9.5*	-6.8*
	- WHEEL ASSY, CLEVELAND	1241156-12	3.5	-6.8
	- TIRE, 6-PLY BLACKWALL	C262003-0202	4.6	-6.8
}	- TUBE	C262023-0101	1.4	-6.8
32-03-A	WHEEL FAIRINGS AND INSTALLATION	0541225-1	16.5*	46.1*
ļ	- NOSE WHEEL FAIRING	0543079-3	3.5	-3.5
	- MAIN WHEEL FAIRINGS (SET OF 2)	0541223-1, -2	10.1	61.1
	- BRAKE FAIRINGS (SET OF 2)	0541224-1, -2	1.1	55.6
	- MOUNTING PLATE (SET OF 2)	0541220-1,-2	8.0	59.5
	33 - LIGHTS			
33-01-S	COURTESY LIGHTS UNDER WING (SET OF 2)	0521101-8	0.5	61.0
33-02-S	NAVIGATION LIGHT DETECTORS (SET OF 2)	0701013-1,-2	0.0	40.8
33-03-8	FLASHING BEACON LIGHT ON VERTICAL FIN	0506003-6	1.4	204.7
33-04-8	STROBE LIGHT INSTALLATION ON WING TIPS	0501027-6	3.4	43.3
33-05-S	LANDING AND TAXI LIGHT INSTL IN WINGS	0523029-2,-7	2.2	25.3
	34 - NAVIGATION			
34-01-R	INDICATOR, AIRSPEED	S3325-1	0.6	16.2
34-02-5	ALTERNATE STATIC AIR SOURCE	0501017-1	0.2	15.5
34-03-R	ALTIMETER WITH 20 FT. MARKINGS, INCHES OF MERCURY	S3328-1	0.9	14.0
34-04-O	ALTIMETER WITH 20 FT. MARKINGS, FEET & MILLIBAR	S3371-1	0.9	14.0
34-05-S	BLIND ALTITUDE ENCODER INSTL	3930402-1	0.9	11.0
34-06-R	COMPASS INSTL, MAGNETIC	0513262-2	0.5	14.0
34-07-S	GYRO, INSTALLATION (REQUIREDS 37-01-S)	0501135-1	6.0*	13.0*
	- DIRECTIONAL GYRO	S3330-1	2.3	14.0
	- ATTITUDE GYRO	S3226-1	2.1	14.0
	- HOSE AND MISC HARDWARE	0501135-1	1.5	10.0
34-08-S	TURN COORDINATOR INDICATOR FOR AUTO PILOT	S3291-1	1.2	14.7
34-09-8	VERTICAL SPEED INDICATOR	S3327-1	0.8	15.7
34-10-A	ADF INSTALLATION	3930404-1	10.4*	26.9*
	- KR 87 ADF RECEIVER	066-01072-0014	3.2	12.1
	- KI 227 ADF INDICATOR	066-03063-0000	0.7	15.9
	- ADF ANTENNA	3960187-1	4.2	39.3
	- ADF CABLE ASSEMBLY	3922102-1	2.3	29.0
34-11-A	GPS INSTALLATION	3930404-1	4.4*	15.3*
	- KING GPS-VFR, KLN-89	066-01148-1111	3.3	12.4
	- GPS ANTENNA	3960190-1	0.3	43.5
	- GPS CABLE ASSEMBLY	3928101-1	0.8	14.1

Figure 6-9. Equipment List Description (Sheet 4 of 7)

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ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING		ARM INS.
	61 - PROPELLER		· 	
61-01-R	PROPELLER ASSY, FIXED PITCH	0550320-14	38.8*	-38.2*
	- PROPELLER, 75 INCH MCCAULEY	1C235/LFA7570	35.0	-38.4
	PROP SPACER ADAPTER, 3.5 INCH MCCAULEY		3.6	-36.0
61-02-R	SPINNER INSTALLATION, PROPELLER	0550320-14	1.8*	-41.0*
	- SPINNER DOME ASSEMBLY	0550367-1	1.0	-42.6
	- FWD SPINNER BULKHEAD	0552231-2	0.3	-40.8
	- AFT SPINNER BULKHEAD	0550321-10	0.4	-37.3
	71 - POWERPLANT	•		Ĺ
71-01-R	FILTER, AIR INTAKE, DONALDSON	P198281	0.3	-27.5
71-02-S	WINTERIZATION KIT INSTL (INSTALLED ARM SHOWN)	0501128-3	0.8*	-20.3*
	- BREATHER TUBE INSTALLATION	0552011	0.4	-13.8
	- COWL INLET COVERS (INSTALLED)	0552229-3,-4	0.3	-32.0
	- COWL INELT COVERS (STOWED)	0552229-3,-4	0.3	95.0
71-03-R	ENGINE, LYCOMING 10-360-L2A	0550359-2	297.8*	
	- FUEL INJECTOR, PAC RSA-5AD1		7.6	-13.9
	- MAGNETOS & HARNESS, SLICK 4371 (SET OF 2)	1	9.0	-5.0
	- OIL FILTER AND ADAPTER		2.5	-18.5
	· SPARK PLUGS	j	1.9	-13.9
	- STARTER, LAMAR 31B22207		11.2	-23.0
	73 - ENGINE FUEL & CONTROL		•	
73-01-S	EGT/FUEL FLOW INDICATOR	S3277-4	0.6	7.8
	77 - ENGINE INDICATING		ł	
77-01-R	TACHOMETER, RECORDING	S3329-1	1.0	12.1
	78 - EXHAUST			1
78-01-R	EXHAUST SYSTEM INSTALLATION	0554012-1	16.3*	-20.0*
	- MUFFLER & TAILPIPE WELD ASSY	0554011-2	4.6	-22.7
	- SHROUD ASSY, MUFFLER HEATER	0554001-9	0.8	-22.7
	79 - OIL		1	
79-01-R	OIL COOLER INSTALLATION	0550359-2	3.3*	-11.0*
, ,	- OIL COOLER, STEWART WARNER	8406-R	2.3	-11.0
79-02-R	OIL PRESSURE & TEMPERATURE INDICATORS	S3279-1	0.4	16.5
	98 - AVIONICS PACKAGE OPTIONS		}	1
98-01-S	STANDARD AVIONICS PACKAGE	3900003-1	28.0*	32.2*
	- 23-05-S BASIC AVN KIT INSTL	3900002-1	11.3	27.4
	- 23-04-S AUDIO/INTERCOM/MARKER BEACON INSTL	3930404-1	2.5	19.7

Figure 6-9. Equipment List Description (Sheet 6 of 7)

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SECTION 7 AIRPLANE & SYSTEMS DESCRIPTION

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Revision 8

INTRODUCTION

This section provides description and operation of the airplane and its systems. Some equipment described herein is optional and may not be installed in the airplane. Refer to the Supplements, Section 9 for details of other optional systems and equipment.

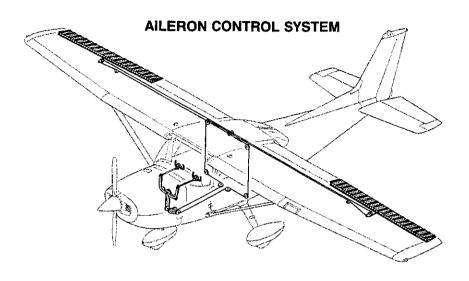
AIRFRAME

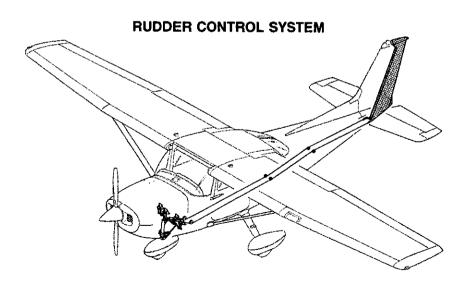
The airplane is an all metal, four-place, high wing, single engine airplane equipped with tricycle landing gear and is designed for general utility and training purposes.

The construction of the fuselage is a conventional formed sheet metal bulkhead, stringer, and skin design referred to as semimonocoque. Major items of structure are the front and rear carry through spars to which the wings are attached, a bulkhead and forgings for main landing gear attachment at the base of the rear door posts, and a bulkhead with attach fittings at the base of the forward door posts for the lower attachment of the wing struts. Four engine mount stringers are also attached to the forward door posts and extend forward to the firewall.

The externally braced wings, containing integral fuel tanks, are constructed of a front and rear spar with formed sheet metal ribs, doublers, and stringers. The entire structure is covered with aluminum skin. The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fittings, and are partial span spars. Conventional hinged ailerons and single slot type flaps are attached to the trailing edge of the wings. The ailerons are constructed of a forward spar containing balance weights, formed sheet metal ribs and "V" type corrugated aluminum skin joined together at the trailing edge. The flaps are constructed basically the same as the ailerons, with the exception of the balance weights and the addition of a formed sheet metal leading edge section.

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o585X1017 Figure 7-1. Flight Control and Trim Systems (Sheet 1 of 2)

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INSTRUMENT PANEL

The instrument panel (Refer to Figure 7-2) is of all-metal construction, and is designed in segments to allow related groups of instruments, switches and controls to be removed without removing the entire panel. For specific details concerning the instruments, switches, circuit breakers, and controls on the instrument panel, refer to related topics in this section.

PILOT PANEL LAYOUT

Flight instruments are contained in a single panel located in front of the pilot. These instruments are designed around the basic "T" configuration. The gyros are located immediately in front of the pilot, and arranged vertically over the control column. The airspeed indicator and altimeter are located to the left and right of the gyros, respectively. The remainder of the flight instruments are clustered around the basic "T". An annunciator panel is located above the altimeter and provides caution and warning messages for fuel quantity, oil pressure, low vacuum and low voltage situations.

To the right of the flight instruments is a sub panel which contains engine tachometer and various navigational heading instruments. To the left of the flight instruments is a sub panel which contains a left/right fuel quantity indicator, an oil temperature/oil pressure indicator, a vacuum gage/ammeter, an EGT/fuel flow indicator, a digital clock/OAT indicator and the avionics circuit breaker panel.

Below the engine and flight instruments are circuit breakers and switches for the airplane systems and equipment. Master, Avionics Master and Ignition Switches are also located in this area of the panel. The parking brake control is positioned below the switch and circuit breaker panel.

CENTER PANEL LAYOUT

The center panel contains various avionics equipment arranged in a vertical rack. This arrangement allows each component to be removed without having to access the backside of the panel. Below the panel are the throttle, mixture, alternate static air and lighting controls.

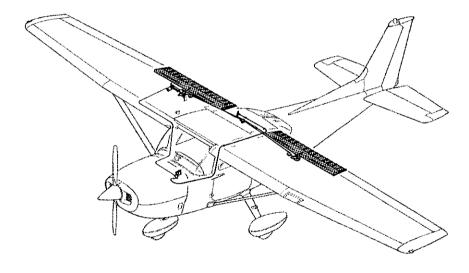
SECTION 7 AIRPLANE & SYSTEMS DESCRIPTION

1.	Oil Temperature and Oil Pressure Indicator	23.	Hour Meter
2.	Vacuum Gage and Ammeter	24.	Glove Box
3.	Fuel Quantity Indicator	25.	Cabin Heat Control
4.	EGT/Fuel Flow Indicator	26.	Cabin Air Control
5.	Digital Clock / O.A.T. Indicator	27.	Flap Switch and Position Indicator
6.	Turn Coordinator	28.	Mixture Control
7.	Airspeed Indicator	29.	Alternate Static Air Control
8.	Directional Gyro	30.	Throttle Control
9.	Attitude Indicator	31.	Radio and Panel Dimming Control
10.	Tachometer	32.	Glareshield and Pedestal Dimming Control
11.	Vertical Speed Indicator	33.	Fuel Shutoff Valve Control
12.	Altimeter	34.	Fuel Selector
13.	Annunciator Panel	35.	Elevator Trim Control and Position Indicator
14.	ADF Bearing Indicator	36.	Avionics Master Switch
15.	Course Deviation and Glide Slope Indicators	37.	Circuit Breakers and Switch/Breakers
16.	Audio Control Panel	38.	Master Switch
17.	GPS Receiver	39.	Ignition Switch
18.	Nav/Com Radio #1	40.	Avionics Circuit Breaker Panel
19.	Nav/Com Radio #2	41.	Hand Held Microphone
20.	ADF Receiver	42.	12 VDC Power Port (Location may vary)
21.	Transponder	43.	Parking Brake
22.	ELT Remote Test Button		

Figure 7-2. Instrument Panel (Sheet 2)

WING FLAP SYSTEM

The single-slot type wing flaps (Refer to Figure 7-3), are extended or retracted by positioning the wing flap switch lever on the instrument panel to the desired flap deflection position. The switch lever is moved up or down in a slotted panel that provides mechanical stops at the 10°, 20° and 30° positions. To change flap setting, the flap lever is moved to the right to clear mechanical stops at the 10° and 20° positions. A scale and pointer to the left of the flap switch indicates flap travel in degrees. The wing flap system circuit is protected by a 10-ampere circuit breaker, labeled FLAP, on the left side of the control panel.



0585X1021

Figure 7-3. Wing Flap System

The rear passengers' seat consists of a fixed, one piece seat bottom and a three-position, reclining back. The reclining back is adjusted by a lever located below the center of the seat frame. To adjust the seat back, raise the lever, position the seat back to the desired angle, release the lever and check that the back is locked in place.

Headrests are installed on both the front and rear seats. To adjust the headrest, apply enough pressure to it to raise or lower it to the desired level.

INTEGRATED SEAT BELT/SHOULDER HARNESS

All seat positions are equipped with integrated seat belts/shoulder harness assemblies (Refer to Figure 7-4). The design incorporates an overhead inertia reel for the shoulder portion, and a retractor assembly for the lap portion of the belt. This design allows for complete freedom of movement of the upper torso area while providing restraint in the lap belt area. In the event of a sudden deceleration, reels lock up to provide positive restraint for the user.

In the front seats, the inertia reels are located on the centerline of the upper cabin. In the rear seats, the inertia reels are located outboard of each passenger in the upper cabin.

To use the integrated seat belt/shoulder harness, grasp the link with one hand, and, in a single motion, extend the assembly and insert into the buckle. Positive locking has occurred when a distinctive "snap" sound is heard.

Proper locking of the lap belt can be verified by ensuring that the belts are allowed to retract into the retractors and the lap belt is snug and low on the waist as worn normally during flight. No more than one additional inch of belt should be able to be pulled out of the retractor once the lap belt is in place on the occupant. If more than one additional inch of belt can be pulled out of the retractor, the occupant is too small for the installed restraint system and the seat should not be occupied until the occupant is properly restrained.

Removal is accomplished by lifting the release mechanism on the buckle or by pressing the release button on the buckle and pulling out and up on the harness. Spring tension on the inertia reel will automatically stow the harness.

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A manually adustable seat belt/shoulder harness assembly is available for all seats.

To use the manually adjustable seat belt/shoulder harness, fasten and adjust the seat belt/shoulder harness first. Lengthen the seat belt as required by pulling on the release strap on the belt. Snap the connecting link firmly into the buckle, then adjust to length. A properly adjusted harness will permit the occupant to lean forward enough to sit erect, but prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot must have the freedom to reach all controls easily.

Disconnecting the manually adjustable seat belt/shoulder harness is accomplished by pushing the button on the buckle to release the connecting link.

ENTRANCE DOORS AND CABIN WINDOWS

Entry to, and exit from the airplane is accomplished through either of two entry doors, one on each side of the cabin at the front seat positions (refer to Section 6 for cabin and cabin door dimensions). The doors incorporate a recessed exterior door handle, a conventional interior door handle, a key operated door lock (left door only), a door stop mechanism, and openable windows in both the left and right doors.

NOTE

The door latch design on this model requires that the outside door handle on the pilot and front passenger doors be extended out whenever the doors are open. When closing the door, do not attempt to push the door handle in until the door is fully shut.

To open the doors from outside the airplane, utilize the recessed door handle near the aft edge of either door by grasping the forward edge of the handle and pulling outboard. To close or open the doors from inside the airplane, use the combination door handle and arm rest. The inside door handle has three positions and a placard at its base which reads OPEN, CLOSE, and LOCK. The handle is spring loaded to the CLOSE (up) position. When the door has been pulled shut and latched, lock it by rotating the door handle forward to the LOCK position (flush with the arm rest). When the handle is rotated to the LOCK position, an over center action will hold it in that position. Both cabin doors should be locked prior to flight, and should not be opened intentionally during flight.

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ENGINE

The airplane is powered by a horizontally opposed, four cylinder, overhead valve, air cooled, fuel injected engine with a wet sump lubrication system. The engine is a Lycoming Model IO-360-L2A and is rated at 160 horsepower at 2400 RPM. Major accessories include a starter and belt driven alternator mounted on the front of the engine, and dual magnetos, dual vacuum pumps, and a full flow oil filter mounted on the rear of the engine accessory case.

ENGINE CONTROLS

Engine power is controlled by a throttle located on the switch and control panel above the center pedestal. The throttle is open in the full forward position and closed in the full aft position. A friction lock, which is a round knurled knob, is located at the base of the throttle and is operated by rotating the lock clockwise to increase friction or counterclockwise to decrease it.

The mixture control, mounted adjacent to the throttle control, is a red knob with raised points around the circumference and is equipped with a lock button in the end of the knob. The rich position is full forward, and full aft is the idle cutoff position. For small adjustments, the control may be moved forward by rotating the knob clockwise, and aft by rotating the knob counterclockwise. For rapid or large adjustments, the knob may be moved forward or aft by depressing the lock button in the end of the control, and then positioning the control as desired.

ENGINE INSTRUMENTS

Engine operation is monitored by the following instruments: oil pressure/oil temperature indicator, tachometer and exhaust gas temperature (EGT) indicator. In addition, the annunciator panel contains a red OIL PRESS annunciator which comes on when the oil pressure is low.

See Section 2, Limitations, for engine operating limitations and instrument markings.

CESSNA MODEL 172R

The EGT system uses a thermocouple in the in the engine exhaust (tailpipe) to supply a voltage proportional to exhaust das temperature. The EGT indicator responds to the voltage developed by the thermocouple. As the mixture is leaned (from full rich), the exhaust gas temperature will increase to a maximum value as the stoichiometric (most chemically efficient) fuel-air ratio is achieved and will decrease if the mixture continues to be leaned.

NEW ENGINE BREAK-IN AND OPERATION

The engine underwent a run in at the factory and is ready for the full range of use. It is, however, suggested that cruising be accomplished at 80% power as much as practicable until a total of 50 hours has accumulated or oil consumption has stabilized. This will ensure proper seating of the rings.

ENGINE LUBRICATION SYSTEM

The engine utilizes a full pressure, wet sump-type lubrication system with aviation grade oil used as the lubricant. The capacity of the engine sump (located on the bottom of the engine) is eight quarts. Oil is drawn from the sump through an oil suction strainer screen into the engine-driven oil pump. From the pump, oil is routed to a bypass valve. If the oil is cold, the bypass valve allows the oil to bypass the oil cooler and go directly from the pump to the full flow oil filter. If the oil is hot, the bypass valve routes the oil out of the accessory housing and into a flexible hose leading to the oil cooler on the right, rear engine baffle. Pressure oil from the cooler returns to the accessory housing where it passes through the full flow oil filter. The filter oil then enters a pressure relief valve which regulates engine oil pressure by allowing excessive oil to return to the sump while the balance of the oil is circulated to various engine parts for lubrication. Residual oil is returned to the sump by gravity flow.

An oil filler cap/oil dipstick is located at the right rear of the engine. The filler cap/ dipstick is accessible through an access door on the top right side of the engine cowling. The engine should not be operated on less than five quarts of oil. For extended flight, fill to eight quarts (dipstick indication only). For engine oil grade and specifications, refer to Section 8 of this handbook.

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EXHAUST SYSTEM

Exhaust gas from each cylinder passes through riser assemblies to a muffler and tailpipe. Outside air is pulled in around shrouds which are constructed around the outside of the muffler to form heating chambers which supply heat to the cabin.

COOLING SYSTEM

Ram air for engine cooling enters through two intake openings in the front of the engine cowling. The cooling air is directed around the cylinders and other areas of the engine by baffling, and is then exhausted through an opening at the bottom aft edge of the cowling. No manual cowl flap cooling system control is required.

PROPELLER

The airplane is equipped with a two-bladed, fixed-pitch, onepiece forged aluminum alloy propeller which is anodized to retard corrosion. The propeller is 75 inches in diameter.

FUEL SYSTEM

The airplane fuel system (see Figure 7-6) consists of two vented integral fuel tanks (one tank in each wing), a three-position selector valve, auxiliary fuel pump, fuel shutoff valve, fuel strainer, engine driven fuel pump, fuel/air control unit, fuel distribution valve and fuel injection nozzles.

A WARNING

UNUSABLE FUEL LEVELS FOR THIS AIRPLANE WERE DETERMINED IN ACCORDANCE WITH FEDERAL AVIATION REGULATIONS. FAILURE TO OPERATE THE AIRPLANE IN COMPLIANCE WITH FUEL LIMITATIONS SPECIFIED IN SECTION 2 MAY FURTHER REDUCE THE AMOUNT OF FUEL AVAILABLE IN FLIGHT.

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FUEL INDICATING

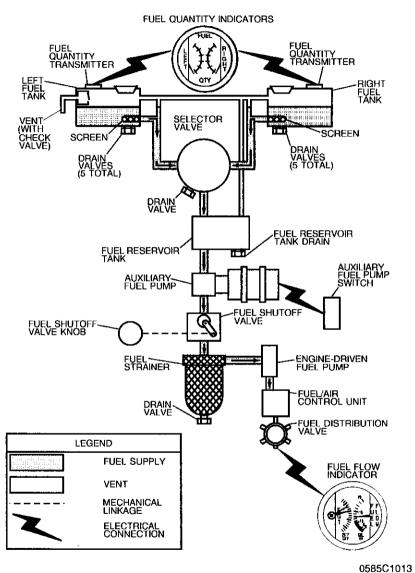
Fuel quantity is measured by two float type fuel quantity transmitters (one in each tank) and indicated by an electrically operated fuel quantity indicator on the left side of the instrument panel. The gauges are marked in gallons of fuel. An empty tank is indicated by a red line and the number 0. When an indicator shows an empty tank, approximately 1.5 gallons remain in each tank as unusable fuel. The indicators should not be relied upon for accurate readings during skids, slips, or unusual attitudes.

Each fuel tank also incorporates warning circuits which can detect low fuel conditions and erroneous transmitter messages. Anytime fuel in the tank drops below approximately 5 gallons (and remains below this level for more than 60 seconds), the amber LOW FUEL message will flash on the annunciator panel for approximately 10 seconds and then remain steady amber. The annunciator cannot be turned off by the pilot. If the left tank is low, the message will read L LOW FUEL. If the right tank is low, the message will read LOW FUEL R. If both tanks are low, the message will read L LOW FUEL R.

In addition to low fuel annunciation, the warning circuitry is designed to report failures with each transmitter caused by shorts, opens or transmitter resistance which increases over time. If the circuitry detects any one of these conditions, the fuel level indicator needle will go to the OFF position (below the 0 mark on the fuel indicator), and the amber annunciator will illuminate. If the left tank transmitter has failed, the message will read L LOW FUEL. If the right tank transmitter has failed, the message will read LOW FUEL R. If both tanks transmitters have failed, the message will read L LOW FUEL R.

Fuel pressure is measured by use of a transducer mounted near the fuel manifold. This transducer produces an electrical signal which is translated for the cockpit-mounted indicator in gallons-perhour.

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W.

Figure 7-6. Fuel System Schematic (Sheet 1 of 2) 17280001 thru 17281187

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SECTION 7 AIRPLANE & SYSTEMS DESCRIPTION

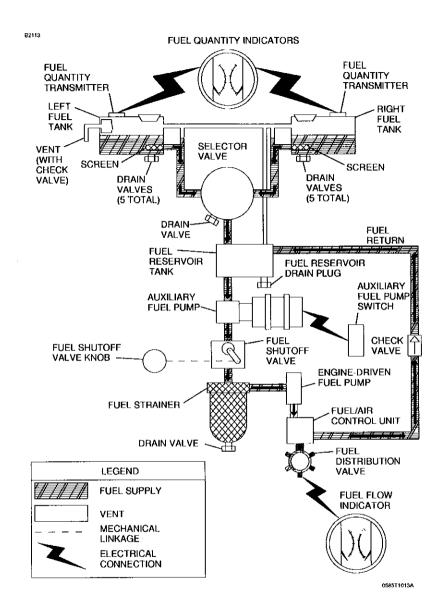


Figure 7-6. Fuel System Schematic (Sheet 2 of 2) 17281188 and On And airplanes incorporating MK172-28-01.

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BRAKE SYSTEM

The airplane has a single-disc, hydraulically actuated brake on each main landing gear wheel. Each brake is connected, by a hydraulic line, to a master cylinder attached to each of the pilot's rudder pedals. The brakes are operated by applying pressure to the top of either the left (pilot's) or right (copilot's) set of rudder pedals, which are interconnected. When the airplane is parked, both main wheel brakes may be set by utilizing the parking brake which is operated by a handle under the left side of the instrument panel. To apply the parking brake, set the brakes with the rudder pedals, pull the handle aft, and rotate it 90° down.

For maximum brake life, keep the brake system properly maintained, and minimize brake usage during taxi operations and landings.

Some of the symptoms of impending brake failure are: gradual decrease in braking action after brake application, noisy or dragging brakes, soft or spongy pedals, and excessive travel and weak braking action. If any of these symptoms appear, the brake system is in need of immediate attention. If, during taxi or landing roll, braking action decreases, let up on the pedals and then reapply the brakes with heavy pressure. If the brakes become spongy or pedal travel increases, pumping the pedals should build braking pressure. If one brake becomes weak or fails, use the other brake sparingly while using opposite rudder, as required, to offset the good brake.

ELECTRICAL SYSTEM

The airplane is equipped with a 28-volt, direct current electrical system (Refer to Figure 7-7). The system is powered by a belt-driven, 60-amp alternator and a 24-volt battery, located on the left forward side of the firewall. Power is supplied to most general electrical circuits through a split primary bus bar, with an essential bus wired between the two primaries to provide power for the master switch, annunciator circuits and interior lighting.

Each primary bus bar is also connected to an avionics bus bar via a single avionics master switch. The primary buses are on anytime the master switch is turned on, and are not affected by starter or external power usage. The avionics buses are on when the master switch and avionics master switch are in the ON position.

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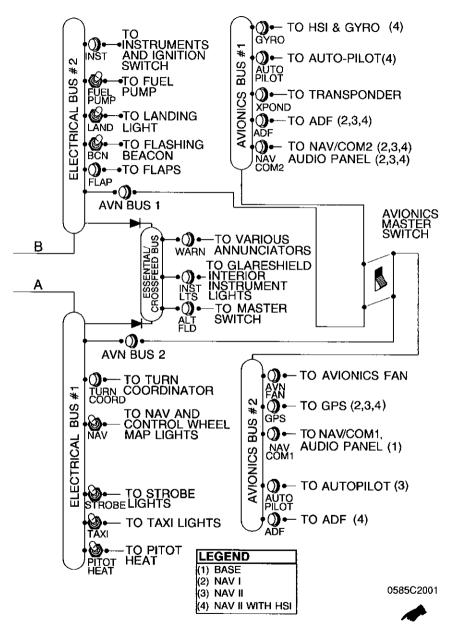


Figure 7-7. Electrical Schematic (Serials 17280001 thru 17280983) (Sheet 2 of 2)

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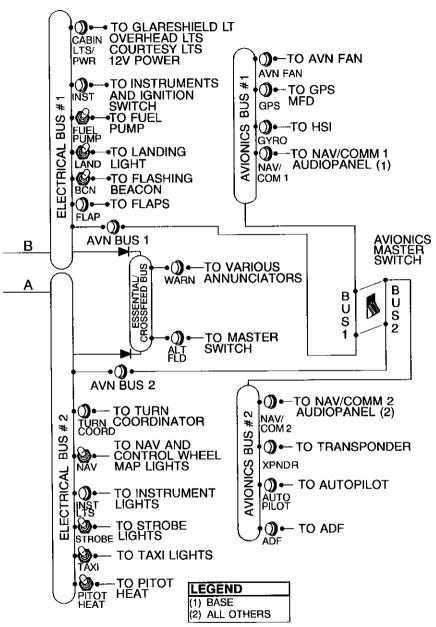


Figure 7-7A. Electrical Schematic (Serials 17280984 and On) (Sheet 1 of 2)

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MASTER SWITCH

The master switch is a split rocker type switch labeled MASTER, and is ON in the up position and OFF in the down position. The right half of the switch, labeled BAT, controls all electrical power to the airplane. The left half, labeled ALT, controls the alternator.

A CAUTION

PRIOR TO TURNING THE MASTER SWITCH ON OR OFF, STARTING THE ENGINE OR APPLYING AN EXTERNAL POWER SOURCE, THE AVIONICS MASTER SWITCH SHOULD BE TURNED OFF TO PREVENT ANY HARMFUL TRANSIENT VOLTAGE FROM DAMAGING THE AVIONICS EQUIPMENT.

Normally, both sides of the master switch should be used simultaneously; however, the BAT side of the switch could be turned on separately to check equipment while on the ground. To check or use avionics equipment or radios while on the ground, the avionics master switch must also be turned on. The ALT side of the switch, when placed in the OFF position, removes the alternator from the electrical system. With this switch in the OFF position, the entire electrical load is placed on the battery. Continued operation with the alternator switch in the OFF position will reduce battery power low enough to open the battery contactor, remove power from the alternator field, and prevent alternator restart.

LOW VOLTAGE ANNUNCIATION

The low voltage warning annunciator is incorporated in the annunciator panel and activates when voltage falls below 24.5 volts. If low voltage is detected, the red annunciation VOLTS will flash for approximately 10 seconds before illuminating steadily. The pilot cannot turn off the annunciator.

In the event an overvoltage condition occurs, the alternator control unit automatically opens the ALT FLD circuit breaker, removing alternator field current and shutting off the alternator. The battery will then supply system current as shown by a discharge rate on the ammeter. Under these conditions, depending on electrical system load, the low voltage warning annunciator will illuminate when system voltage drops below normal. The alternator control unit may be reset by resetting the circuit breaker. If the low voltage warning annunciator extinguishes, normal alternator charging has resumed; however, if the annunciator illuminates again, a malfunction has occurred, and the flight should be terminated as soon as practical.

NOTE

Illumination of the low voltage annunciator and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM.

CIRCUIT BREAKERS AND FUSES

All circuit breakers inside the airplane are of the "push to reset" or "switch/breaker" type. The power distribution module (J-Box) uses either "push to reset" circuit breakers or spade type (automotive style) fuses. One glass type fuse is also used to provide power to the clock.

On aircraft using spade type fuses in the power distribution module (J-Box), a spare fuse is also included. If the spare fuse is used, a replacement spare should be obtained and reinstalled before the next flight.

LIGHTING SYSTEMS

EXTERIOR LIGHTING

Exterior lighting consists of navigation lights on the wing tips and top of the rudder, a dual landing/taxi light configuration located in the left wing leading edge, a flashing beacon mounted on top of the vertical fin, and a strobe light on each wing tip. In addition, two courtesy lights are recessed into the lower surface of each wing and provide illumination for each cabin door area.

The exterior courtesy lights (and the rear cabin dome light) are turned on by pressing the rear cabin light switch. Pressing the rear cabin light switch again will extinguish the three lights. The remaining exterior lights are operated by breaker/switches located on the lower left instrument panel. To activate these lights, place switch in the UP position. To deactivate light, place in the DOWN position.

NOTE

The strobes and flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can produce vertigo and loss of orientation.

INTERIOR LIGHTING

Interior lighting is controlled by a combination of flood lighting, glareshield lighting, pedestal lighting, panel lighting, radio lighting and pilot control wheel lighting.

Flood lighting is accomplished using two lights in the front and a single dome light in the rear. All flood lights are contained in the overhead console, and are turned on and off with push type switches located near each light. The two front lights are individually rotatable, providing directional lighting for the pilot and front passenger. The rear dome light is a fixed position light and provides for general illumination in the rear cabin area.

CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM

The temperature and volume of airflow into the cabin can be regulated by manipulation of the push-pull CABIN HT and CABIN AIR controls (Refer to Figure 7-8). Both controls are the double-button locking type and permit intermediate settings.

For cabin ventilation, pull the CABIN AIR knob out. To raise the air temperature, pull the CABIN HT knob out approximately 1/4 to 1/2 inch for a small amount of cabin heat. Additional heat is available by pulling the knob out farther; maximum heat is available with the CABIN HT knob pulled out and the CABIN AIR knob pushed full in. When no heat is desired in the cabin, the CABIN HT knob is pushed full in.

Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and copilot's feet. Rear cabin heat and air is supplied by two ducts from the manifold, one extending down each side of the cabin to an outlet just aft of the rudder pedals at floor level. Windshield defrost air is also supplied by two ducts leading from the cabin manifold to defroster outlets near the lower edge of the windshield. Two knobs control sliding valves in either defroster outlet to permit regulation of defroster airflow.

Separate adjustable ventilators supply additional air; one near each upper corner of the windshield supplies air for the pilot and copilot, and two ventilators are available for the rear cabin area to supply air to the rear seat passengers. There are additional ventilators located in various positions in the cockpit.

PITOT-STATIC SYSTEM AND INSTRUMENTS

The pitot-static system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator, vertical speed indicator and altimeter. The system is composed of a heated pitot tube mounted on the lower surface of the left wing, an external static port on the lower left side of the forward fuselage, and the associated plumbing necessary to connect the instruments to the sources.

The heated pitot system consists of a heating element in the pitot tube, a 5-amp switch/breaker labeled PITOT HEAT, and associated wiring. The switch/breaker is located on the lower left side of the instrument panel. When the pitot heat switch is turned on, the element in the pitot tube is heated electrically to maintain proper operation in possible icing conditions.

A static pressure alternate source valve is installed below the throttle, and can be used if the external static source is malfunctioning. This valve supplies static pressure from inside the cabin instead of the external static port.

If erroneous instrument readings are suspected due to water or ice in the pressure line going to the standard external static pressure source, the alternate static source valve should be pulled on.

Pressures within the cabin will vary with open heater/vents and windows. Refer to Section 5 for the effect of varying cabin pressures on airspeed readings.

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ALTIMETER

Airplane altitude is depicted by a barometric type altimeter. A knob near the lower left portion of the indicator provides adjustment of the instrument's barometric scale to the current altimeter setting.

VACUUM SYSTEM AND INSTRUMENTS

The vacuum system (Refer to Figure 7-9) provides suction necessary to operate the attitude indicator and the directional indicator. The system consists of two engine-driven vacuum pumps, two pressure switches for measuring vacuum available through each pump, a vacuum relief valve, a vacuum system air filter, vacuum operated instruments, a suction gauge, low vacuum warning on the annunciator, and a manifold with check valves to allow for normal vacuum system operation if one of the vacuum pumps should fail.

ATTITUDE INDICATOR

The attitude indicator is a vacuum air-driven gyro that gives a visual indication of flight attitude. Bank attitude is presented by a pointer at the top of the indicator relative to the bank scale which has index marks at 10°, 20°, 30°, 60°, and 90° either side of the center mark. Pitch and roll attitudes are presented by a miniature airplane superimposed over a symbolic horizon area divided into two sections by a white horizon bar. The upper "blue sky" area and the lower "ground" area have pitch reference lines useful for pitch attitude control. A knob at the bottom of the instrument is provided for in-flight adjustment of the symbolic airplane to the horizon bar for a more accurate flight attitude indication.

DIRECTIONAL INDICATOR

The directional indicator is a vacuum air-driven gyro that displays airplane heading on a compass card in relation to a fixed simulated airplane image and index. The indicator will precess slightly over a period of time. Therefore, the compass card should be set with the magnetic compass just prior to takeoff, and readjusted as required throughout the flight. A knob on the lower left edge of the instrument is used to adjust the compass card to correct for precession. A knob on the lower right edge of the instrument is used to move the heading bug.

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VACUUM GAGE

The vacuum gage is part of the ammeter/vacuum gage, located on the lower left corner of the instrument panel. It is calibrated in inches of mercury and indicates vacuum air available for operation of the attitude and directional indicators. The desired vacuum range is 4.5 to 5.5 inches of mercury. Normally, a vacuum reading out of this range may indicate a system malfunction or improper adjustment, and in this case, the attitude and directional (heading) indicators should not be considered reliable. However, due to lower atmospheric pressures at higher altitudes, the vacuum gage may indicate as low as 4.0 in. Hg. at 20,000 feet and still be adequate for normal system operation.

LOW VACUUM ANNUNCIATION

Each engine-driven vacuum pump is plumbed to a common manifold, located forward of the firewall. From the tee, a single line runs into the cabin to operate the various vacuum system instruments. This tee contains check valves to prevent back flow into a pump if it fails. Transducers are located just upstream of the tee and measure vacuum output of each pump.

If output of the left pump falls below 3.0 in. Hg., the amber L VAC message will flash on the annunciator panel for approximately 10 seconds before turning steady on. If output of the right pump falls below 3.0 in. Hg., the amber VAC R message will flash on the annunciator panel for approximately 10 seconds before turning steady on. If output of both pumps falls below 3.0 in. Hg., the amber L VAC R message will flash on the annunciator panel for approximately 10 seconds before turning steady on.

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AVIONICS SUPPORT EQUIPMENT

Avionics operations are supported by the avionics cooling fan, microphone and headset installations and static discharge wicks.

AVIONICS COOLING FAN

An avionics cooling fan is installed on the left side of the interior firewall. The system utilizes a single electric fan and associated ductwork to force-cool the center stack radios.

Power to the electric fan is supplied through the AVN FAN circuit breaker. The fan operates whenever the Master and Avionics Master switches are both ON.

MICROPHONE AND HEADSET INSTALLATIONS

Standard equipment for the airplane includes a handheld microphone, an overhead speaker, two remote-keyed microphone switches on the control wheels, and provisions for boom mic/headsets at each pilot and passenger station.

The hand-held microphone contains an integral push-to-talk switch. This microphone is plugged into the center pedestal and is accessible to both the pilot and front passenger. Depressing the push-to-talk switch allows audio transmission on the Com radios.

The overhead speaker is located in the center overhead console. Volume and output for this speaker is controlled through the audio panel.

Each control wheel contains a miniature push-to-talk switch. This switch allows the pilot or front passenger to transmit on the Com radios using remote mics.

Each station of the airplane is wired for aviation-style headsets. Mic and headphone jacks are located on each respective arm rest and allow for communications between passengers and pilot. The system is wired so that microphones are all voice-activated. Additional wiring provisions inside the audio panel ensure that only the pilot or front passenger can transmit through the com radios.

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CABIN FEATURES

EMERGENCY LOCATOR TRANSMITTER (ELT)

A remote switch/annunciator is installed on the top center location of the copilot's instrument panel for control of the ELT from the flight crew station. The annunciator, which is in the center of the rocker switch, illuminates when the ELT transmitter is transmitting. The ELT emits an omni-directional signal on the international distress frequencies of 121.5 MHz and 243.0 MHz. General aviation and commercial aircraft, the FAA and CAP monitor 121.5 MHz, and 243.0 MHz is monitored by the military. For a basic overview of the ELT, refer to the Supplements, Section 9.

CABIN FIRE EXTINGUISHER

A portable Halon 1211 (Bromochlorodifluoromethane) fire extinguisher is standard and is installed on the floorboard near the pilot's seat where it would be accessible in case of fire. The extinguisher has an Underwriters Laboratories classification of 5B:C. If installed, the extinguisher should be checked prior to each flight to ensure that its bottle pressure, as indicated by the gauge on the bottle, is within the green arc (approximately 125 psi) and the operating lever lock pin is securely in place.

To operate the fire extinguisher:

- 1. Loosen retaining clamp(s) and remove extinguisher from bracket.
- 2. Hold extinguisher upright, pull operating ring pin, and press lever while directing the discharge at the base of the fire at the near edge. Progress toward the back of the fire by moving the nozzle rapidly with a side to side sweeping motion.

SECTION 8

AIRPLANE HANDLING, SERVICE & MAINTENANCE

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INTRODUCTION

This section contains factory recommended procedures for proper ground handling and routine care and servicing of your airplane. It also identifies certain inspection and maintenance requirements which must be followed if your airplane is to retain that new airplane performance and dependability. It is important to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered in your local area.

Keep in touch with your local Cessna Service Station and take advantage of their knowledge and experience. Your Cessna Service Station knows your airplane and how to maintain it, and will remind you when lubrications and oil changes are necessary, as well as other seasonal and periodic services.

The airplane should be regularly inspected and maintained in accordance with information found in the airplane maintenance manual and in company issued service bulletins and service newsletters. All service bulletins pertaining to the aircraft by serial number should be accomplished and the airplane should receive repetitive and required inspections. Cessna does not condone modifications, whether by Supplemental Type Certificate or otherwise, unless these certificates are held and/or approved by Cessna. Other modifications may void warranties on the airplane since Cessna has no way of knowing the full effect on the overall airplane. Operation of an airplane that has been modified may be a risk to the occupants, and operating procedures and performance data set forth in the operating handbook may no longer be considered accurate for the modified airplane.

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UNITED STATES AIRPLANE OWNERS

If your airplane is registered in the U. S., appropriate Cessna Owner Advisories will be mailed to you automatically according to the latest aircraft registration name and address which you have provided to the FAA. Therefore, it is important that you provide correct and up-to-date mailing information to the FAA.

If you require a duplicate Owner Advisory to be sent to an address different from the FAA aircraft registration address, please complete and return an Owner Advisory Application (otherwise no action is required on your part).

INTERNATIONAL AIRPLANE OWNERS

To receive Cessna Owner Advisories, please complete and return an Owner Advisory Application.

Receipt of a valid Owner Advisory Application will establish your Cessna Owner Advisory service for one year, after which you will be sent a renewal notice. It is important that you respond promptly to update your address for this critical service.

PUBLICATIONS

Various publications and flight operation aids are furnished in the airplane when delivered from the factory. These items are listed below.

- Customer Care Program Handbook
- Pilot's Operating Handbook and FAA Approved Airplane Flight Manual
- Pilot's Checklist
- Passenger Briefing Card
- Cessna Sales and Service Directory

To obtain additional publications or Owner Advisory information, you may contact Cessna's Product Support Department at (316) 517-5800. Fax (316) 942-9006 or write to The Cessna Aircraft Company, P.O. Box 7706, Wichita, KS 67277, Dept 751C.

To be carried in the airplane at all times:

Current Pilot's Operating Handbook and FAA Approved
 Airplane Flight Manual.

2. Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).

3. Equipment List.

To be made available upon request:

- 1. Airplane Logbook.
- 2. Engine Logbook.

Most of the items listed are required by the United States Federal Aviation Regulations. Since the Regulations of other nations may require other documents and data, owners of airplanes not registered in the United States should check with their own aviation officials to determine their individual requirements.

Cessna recommends that these items, plus the Pilot's Checklists, Customer Care Program Handbook and Customer Care Card, be carried in the airplane at all times.

AIRPLANE INSPECTION PERIODS

FAA REQUIRED INSPECTIONS

As required by U.S. Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required annual inspection, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

The FAA may require other inspections by the issuance of airworthiness directives applicable to the airplane, engine, propeller and components. It is the responsibility of the owner/operator to ensure compliance with all applicable airworthiness directives, and when the inspections are repetitive, to take appropriate steps to prevent inadvertent noncompliance.

PILOT CONDUCTED PREVENTIVE MAINTENANCE

A certified pilot who owns or operates an airplane not used as an air carrier is authorized by FAR Part 43 to perform limited maintenance on his airplane. Refer to FAR Part 43 for a list of the specific maintenance operations which are allowed.

NOTE

Pilots operating airplanes of other than U.S. registry should refer to the regulations of the country of certification for information on preventive maintenance that may be performed by pilots.

A Maintenance Manual must be obtained prior to performing any preventive maintenance to ensure that proper procedures are followed. Your local Cessna Service Station should be contacted for further information or for required maintenance which must be accomplished by appropriately licensed personnel.

ALTERATIONS OR REPAIRS

It is essential that the FAA be contacted prior to any alterations on the airplane to ensure that airworthiness of the airplane is not violated. Alterations or repairs to the airplane must be accomplished by licensed personnel, utilizing only FAA Approved components and FAA Approved data, such as Cessna Service Bulletins.

TIE-DOWN

Proper tie-down procedure is the best precaution against damage to the parked airplane by gusty or strong winds. To tie-down the airplane securely, proceed as follows:

- 1. Set the parking brake and install the control wheel lock.
- 2. Install a surface control lock over the fin and rudder.
- 3. Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing, tail and nose tie-down fittings and secure each rope or chain to a ramp tie-down.
- 4. Install a pitot tube cover.

JACKING

When a requirement exists to jack the entire airplane off the ground, or when wing jack points are used in the jacking operation, refer to the Maintenance Manual for specific procedures and equipment required.

Individual main gear may be jacked by using the jack pad which is incorporated in the main landing gear strut step bracket. When using the individual gear strut jack pad, flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must then be lowered for a second jacking operation. Do not jack both main wheels simultaneously using the individual main gear jack pads.

A CAUTION

DO NOT APPLY PRESSURE ON THE ELEVATOR OR HORIZONTAL STABILIZER SURFACES. WHEN PUSHING ON THE TAILCONE, ALWAYS APPLY PRESSURE AT A BULKHEAD TO AVOID BUCKLING THE SKIN.

If nose gear maintenance is required, the nose wheel may be raised off the ground by pressing down on a tailcone bulkhead, just forward of the horizontal stabilizer, and allowing the tail to rest on the tail tie-down ring.

A WARNING

FOR MAXIMUM SAFETY, CHECK THAT THE IGNITION SWITCH IS OFF, THE THROTTLE IS CLOSED, THE MIXTURE CONTROL IS IN THE IDLE CUT OFF POSITION, AND THE AIRPLANE IS SECURED BEFORE ROTATING THE PROPELLER BY HAND. DO NOT STAND WITHIN THE ARC OF THE PROPELLER BLADES WHILE TURNING THE PROPELLER.

After 30 days, the airplane should be flown for 30 minutes or a ground runup should be made just long enough to produce an oil temperature within the lower green arc range. Excessive ground runup should be avoided.

Engine runup also helps to eliminate excessive accumulations of water in the fuel system and other air spaces in the engine. Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather. If the airplane is to be stored temporarily, or indefinitely, refer to the Maintenance Manual for proper storage procedures.

SERVICING

In addition to the Preflight Inspection covered in Section 4 of this handbook, complete servicing, inspection and test requirements for your airplane are detailed in the Maintenance Manual. The Maintenance Manual outlines all items which require attention at specific intervals plus those items which require servicing, inspection, and/or testing at special intervals.

Since Cessna Service Stations conduct all service, inspection, and test procedures in accordance with applicable Maintenance Manuals, it is recommended that you contact your local Cessna Service Station concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care ensures that these requirements are accomplished at the required intervals to comply with the 100 hour or annual inspection as previously covered.

CAPACITY OF ENGINE SUMP

The engine lubrication system has a total capacity of 9 quarts of oil, with the oil filter accounting for 1 quart of that total. The engine oil sump (crankcase) has a capacity of 8 quarts. The engine must not be operated with less than 5 quarts in the sump. For extended flights, the engine oil level should be at 8 quarts.

OIL AND OIL FILTER CHANGE

After the first 25 hours of operation, drain the engine oil sump and replace the filter. Refill sump with straight mineral oil and use until a total of 50 hours has accumulated or oil consumption has stabilized; then change to ashless dispersant oil. Ashless dispersant oil (and oil filter) should then be changed at time intervals set forth by the engine manufacturer.

NOTE

During the first 25 hour oil and filter change, a general inspection of the overall engine compartment is required. Items which are not normally checked during a preflight inspection should be given special attention. Hoses, metal lines and fittings should be inspected for signs of oil and fuel leaks, and checked for abrasions, chafing, security, proper routing and support, and evidence of deterioration. Inspect the intake and exhaust systems for cracks, evidence of leakage, and security of attachment. Engine controls and linkages should be checked for freedom of movement through their full range, security of attachment and evidence of wear. Inspect wiring for security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration, and corroded terminals. Check the alternator belt in accordance with Maintenance Manual instructions, and retighten if necessary. A periodic check of these items during subsequent servicing operations is recommended.

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One exception to this can be encountered when operating under the combined effect of: (1) use of certain fuels, with (2) high humidity conditions on the ground (3) followed by flight at high altitude and low temperature. Under these unusual conditions, small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to help alleviate the possibility of fuel icing occurring under these unusual conditions, it is permissible to add isopropyl alcohol or diethylene glycol monomethyl ether (DiEGME) compound to the fuel supply.

The introduction of alcohol or DiEGME compound into the fuel provides two distinct effects: (1) it absorbs the dissolved water from the gasoline and (2) alcohol has a freezing temperature depressant effect.

NOTE

When using fuel additives, it must be remembered that the final goal is to obtain a correct fuel-to-additive ratio in the tank, and not just with fuel coming out of the refueling nozzle. For example, adding 15 gallons of correctly proportioned fuel to a tank which contains 20 gallons of untreated fuel will result in a lower-than-acceptable concentration level to the 35 gallons of fuel which now reside in the tank.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To ensure proper mixing, the following is recommended:

 For best results, the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fueling nozzle.

2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transferring this mixture to the tank prior to the fuel operation.

Diethylene glycol monomethyl ether (DiEGME) compound must be carefully mixed with the fuel in concentrations between 0.10% (minimum) and 0 .15% (maximum) of total fuel volume. Refer to Figure 8-1 for a DiEGME-to-fuel mixing chart.

A CAUTION

ANTI-ICING ADDITIVE IS DANGEROUS TO HEALTH WHEN BREATHED AND/OR ABSORBED INTO THE SKIN.

A CAUTION

MIXING OF DIEGME WITH FUEL IS EXTREMELY IMPORTANT, A CONCENTRATION IN EXCESS OF THAT RECOMMENDED (0.15% BY VOLUME MAXIMUM) MAY RESULT IN DETRIMENTAL EFFECTS TO THE FUEL TANK SEALANT, AND DAMAGE TO O-RINGS AND SEALS USED IN THE FUEL SYSTEM AND ENGINE COMPONENTS. A CONCENTRATION OF LESS THAN THAT RECOMMENDED (0.10% BY TOTAL VOLUME MINIMUM) WILL RESULT IN INEFFECTIVE TREATMENT, USE ONLY BLENDING EQUIPMENT RECOMMENDED BY THE THAT IS **MANUFACTURER** TO **OBTAIN PROPER** PROPORTIONING.

Prolonged storage of the airplane will result in a water buildup in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

LANDING GEAR

Consult the following table for servicing information on the landing gear.

COMPONENT	SERVICING CRITERIA
Nose Wheel (5.00-5, 6-Ply Rated Tire)	34.0 PSI 45 PS/
Main Wheel (6.00-6, 4-Ply Rated Tire)	28:0 PSI 38 PS1
Brakes	MIL-H-5606
Nose Gear Shock Strut	MIL-H-5606; 45.0 PSI *

* Keep strut filled with MIL-H-5606 hydraulic fluid per filling instructions placard, and with no load on the strut, inflate with air to 45.0 PSI. Do not over inflate.

CLEANING AND CARE

WINDSHIELD AND WINDOWS

The plastic windshield and windows should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, oil scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloths.

A CAUTION

NEVER USE GASOLINE, BENZENE, ALCOHOL, ACETONE, FIRE EXTINGUISHER, ANTI-ICE FLUID, LACQUER THINNER OR GLASS CLEANER TO CLEAN THE PLASTIC. THESE MATERIALS WILL ATTACK THE PLASTIC AND MAY CAUSE IT TO CRAZE.

If a windshield cleaner is not available, the plastic can be cleaned with soft cloths moistened with Stoddard solvent to remove oil and grease.

When the airplane is parked outside in cold climates and it is necessary to remove ice before flight, care should be taken to protect the painted surfaces during ice removal with chemical liquids. Isopropyl alcohol will satisfactorily remove ice accumulations without damaging the paint. However, keep the isopropyl alcohol away from the windshield and cabin windows since it will attack the plastic and may cause it to craze.

PROPELLER CARE

Preflight inspection of propeller blades for nicks, and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long blade life. Small nicks on the propeller, particularly near the tips and on the leading edges, should be dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks or failure of the propeller blade. Never use an alkaline cleaner on the blades; remove grease and dirt with Stoddard solvent.

ENGINE CARE

The engine may be cleaned, using a suitable solvent, in accordance with instructions in the airplane Maintenance Manual. Most efficient cleaning is done using a spray type cleaner. Before spray cleaning, ensure that protection is afforded for components which might be adversely affected by the solvent. Refer to the Maintenance Manual for proper lubrication of controls and components after engine cleaning. The induction air filter should be replaced when its condition warrants, not to exceed 500 hours.

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